SPECIAL RESOURCE ISSUE!

June 1990

DESIGN-A-64 CONTEST WINNERS!

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Cover photo by Michael Rogalski (See "Horizons")

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COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Edited by Mickey McLean

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Video Value

Now you can live out your Indiana Jones fantasies on both your computer and television screens. Lucasfilm Games (P.O. Box 2009, San Rafael, California 94912) is offering a special promotion in conjunction with the release of the movie *Indiana Jones and the Last Crusade* on videocassette.

If you buy one of the games—*The Action Game* or *The Graphic Adventure*—based on the hit movie, you can purchase the VHS video for $10.00. Buy both and you'll receive the video, which retails for $24.95, for free.

To qualify for the offer, you must have purchased one or more Indy games from a participating retailer between February 1 and June 30, 1990. *The Action Game* is available for the Commodore 64, but *The Graphic Adventure* has been released only for the Amiga, Atari ST, and IBM PC and compatible computers. Details concerning proof of purchase and other requirements are available at participating retailers throughout the U.S. and Canada.

Bank on It

Computer Craftware (17966 Arbolada Way, Tustin, California 92680) has introduced *√Book* ($34.95), a personal electronic check register for the 64 and 128.

The program uses a single-entry system to record 17 different types of checking transactions including automatic payments, deposits, withdrawals, electronic transfers, debit-card transactions, interest, monthly and yearly fees, service charges, ATM transactions, overdraft repayments, and balance adjustments.

With a printer, you can generate eight types of reports such as transaction registers, payee reports, daily balance reports, daily balance charts, categorized transactions, and overdraft history reports. You can also print checks.

A utilities program is included with *√Book* that supports the 1581 disk drive. In addition to directory displays, DOS commands, headers, file copy, and backup utilities, it provides functions that let you create and access partitioned subdirectories for as many levels as will fit on a disk.

The program disk contains both 64 and 128 versions. The 128 version requires an 80-column RGB monitor to run in 128 mode and features pull-down menus, double-processor speed, and utilization of the 128's additional RAM for sorting and disk copies.

Colossal Compilation

Virgin Mastertronic (18001 Cowan, Suites A & B, Irvine, California 92714) has announced the release of Mega Pack for the Commodore 64 and 128. The $34.99 package includes ten original games previously available only in Europe.

The ten titles developed by Gremlin Graphics are *Bulldog, Cosmic Causeway, Future Knight, Jack the Nipper II, Krackout, Monty on the Run, North Star, Rebounder, The Thing Bounces Back,* and *Trailblazer.*

Mega Pack is distributed under Virgin Mastertronic's new Virgin Games brand of arcade titles.

Picture This!

The accompanying picture is just a sample of the downloadable Commodore 64 and 128 graphics available on QuantumLink. The graphics software library found in the Commodore area of Q-Link contains more than 6400 graphics files, including some animations. The public domain files were created on a 64 or 128 with 64K video RAM capabilities.

To locate the Commodore graphics area on Q-Link, access the Computing Support Groups on the Commodore Information Network and call up Graphics. Pictures are stored in both the 64 and 128 sections of the software libraries.

For more information on the Q-Link Commodore graphics files, contact the Pickfest Q-Link Graphics Support Group at 521 North Street NW, Warren, Ohio 44483.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Japanese Import

Direct from the Land of the Rising Sun comes *Curse of Babylon*, an arcade-action game from Kyodai Software Marketing (58 Mitchell Boulevard, San Rafael, California 94903). *Curse of Babylon* includes some role-playing, but it doesn't require you to learn or memorize any complicated scenarios.

The $24.95 game places you in the role of hero, and it's up to you to save the world of Babylon from hordes of monsters including zombies, rock creatures, and giant blue lizards.

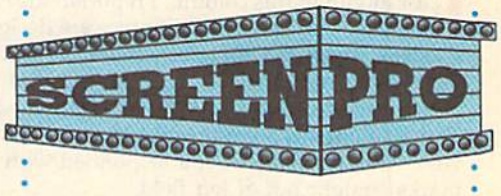
Features include 12 increasingly difficult levels with over 150 rooms to explore. Seven different soundtracks accompany the action on the screen.

Kyodai games are distributed in the U.S. by Brøderbund Software.

Graphics Translator for 128

Starfollower Productions (4224 Bakman, North Hollywood, California 91602) has released *Ante Up* ($19.95), a *Basic 8* graphics translator that converts 40-column graphics from GEOS, Koala, *Doodle*, ComputerEyes, and *The Print Shop* into 80-column *Basic 8*–compatible pictures.

Onscreen features include the ability to change 80-column cell sizes, and the *Basic 8* functions allow the changing of colors or the cell size, or the flipping and negating of pictures and brushes. All translations are performed in machine language and take seconds for conversion. *Ante Up* requires 64K of video RAM.



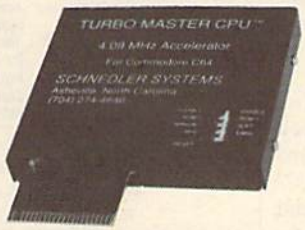
Big Production

With *Screen-Pro* ($24.95), from Accu-Tome Productions (36 Myers Court, Medford, Oregon 97501), you can quickly create menus, displays, game backgrounds, cartoons, and video credits on your Commodore 64.

This complete screen-and-animation production system comes with two disks, various drivers, complete documentation, plus sample screens and animation sequences. *Screen-Pro* is written entirely in machine language.

Back in Stock!

Make your Commodore a *Speed Demon*



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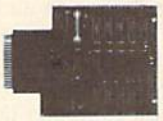

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- C64 Source Code Book. Kernal and Basic ROMs. $29.95

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EDITOR'S notes

Last month in this column, I reported the results of the "1989 *Gazette* Readership Survey." All survey questions were designed to let us quickly tabulate your responses, come up with totals, averages, and, finally, meaningful results. The "Additional comments" section at the end of the survey form, however, was impossible to quantify. It's here that many of you let your hair down. While some of the comments were just quick notes of the "good job" or "I enjoy your magazine" variety, many of you responded with incisive humor, biting sarcasm, or remarks straight out of left field.

It was heartening to see how many readers from outside the U.S. and Canada took the time to fill out their surveys. We have greetings from Holland, Israel, Sweden, Colombia, Belgium ("I read your *Gazette* three times a week"), and Australia ("If you think Commodore's support is bad in the states, then come to Australia. It's nonexistent.").

Many of you commented on the change in binding and paper. Some like it, some don't: "Thanks for the nonglare paper," "The new saddle-stitch binding stinks!" "The new binding helps when I type in programs," "The old binding was better—now I can't read the issue date on the spine," "Like your new binding—much easier to tear off the ads," and "I despise stapled magazines. For this reason, I may not resubscribe. *Run* did it, too, and I'll probably drop it!"

Our columnists earned a lot of positive comments. A Canadian reader writes: "One day when I get my driver's license, I'm going to buzz over to Lansing, Michigan, and meet Fred D'Ignazio. It would be a dream come true." Another reader writes: "Not to take anything away from the rest of the staff, but Jim Butterfield and Larry Cotton could be the backbone of any computer magazine. If they had been with *Ahoy!*, their ship would still be afloat." A young reader named Jeff notes that he's been reading *Gazette* for more than half his life. He's now 13. He writes: "I feel like I've known some of your writers, like Jim Butterfield and Fred D'Ignazio, all of my life. I also have favorites, like Rhett Anderson, Randy Thompson, Ervin Bobo, and . . . oh, yes, Lance Elko." Jeff, you knew I'd be reading these surveys, didn't you?

Because we serve such a wide audience, we obviously do not (and cannot) meet everyone's needs: "Your magazine is too complicated for beginners," "Make ML programming more advanced. I learned all that stuff when I was 13! Honestly! Stack processing! Ha! Child's play!" "*Gazette* should be more than a magazine for children," and "If I'm a bit computer literate, I owe it to you (and your readers)." Then there's a reader who told us: "I subscribed to your magazine because you published an article on Boolean algebra."

A lot of readers told us what they wanted to see in the magazine. While many jotted "more utilities," "more pages," or "more programming hints," others took the opportunity to be pretty specific: "Write a Plus/4 compiler and 128 programs without sprites," "Print hobby utilities such as databases for female computerists," and "Use ink that doesn't smear when I rub on your pages!" It might be suggested to the author of the final comment that he or she simply abstain from rubbing on our pages.

One reader from California pledged his loyalty in a unique fashion: "C'mon, guys, how am I gonna brag at the user group if you don't print some of my ideas, which are better than some I've seen in your mag? I'll give you one more decade, then I ain't gonna renew my subscription."

The winner for Best Non-Comment Comment goes to this reader: "I ignore the articles I dislike and peruse those I like." And the winner for Strangest Remark: "Every time I pick up *Run* or *COMPUTE!*, it says: 'Free Disk for IBM Compatibles,' 'This Game for 128 Only!,' 'For Amiga Only!' Don't you think some of us get tired of buying a magazine and three-quarters of it you can't use? That's why I quit *Playboy*."

See you next month.

Lance Elko

Lance Elko
Associate Publisher

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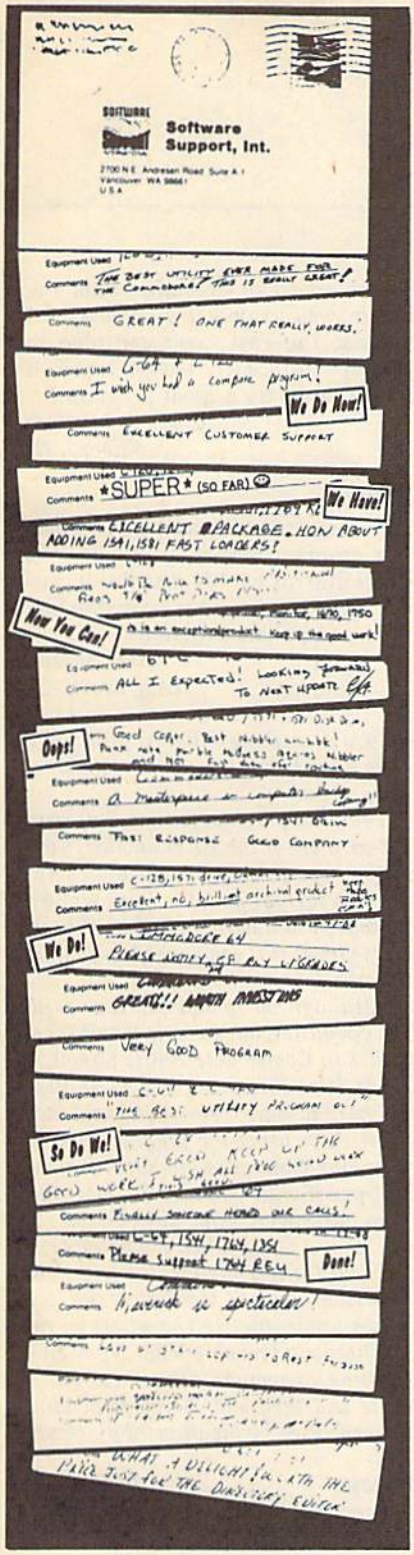
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If you've had your Commodore for more than a few weeks, you've probably heard of Maverick. It has become the standard against which all other utility programs are judged. You probably know someone who uses Maverick. Maybe they bought a copy. Maybe they "borrowed" a copy from a friend. Whatever. The time has come to speak frankly and honestly.

The Commodore market is in transition. Newer machines have eclipsed the 8-bit Commodore computer. New buyers are going elsewhere. And many companies are shifting loyalties, dropping Commodore products to pursue greener pastures. Not us. We've always been there pushing the envelope, making your Commodore do things it shouldn't be able to do. We've always supported you. Now we're asking you to support us.

Maverick V5 is our final version of Maverick. We've perfected the program to the very edge of our capabilities. We've made it as good as our skills allow. And while we'll still offer future parameter disks to keep up with new programs and protection schemes, there will never be a Maverick V6. We can look you right in the eye and say "This is our best shot - it won't get any better than this."

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Products from other companies are described in vague generalities, because they can't elaborate on features they don't have. But take a look at our detailed listing below and you'll understand just why Maverick has become the industry criterion. Protect your software investment. Don't settle for anything less than the product that inspired the comments on the cards on the left. Buy Maverick V5 today - and deal yourself a very good hand.

MAVERICK V5

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- **NEW** GEO-BOOT: Now supports 1571 and 1541 drives as well as the 1581 disk drive. After using this feature, your entire GEOS library becomes file-copyable.
- Quick File Copier: Supports 1541 71 81 formats - any direction. Includes more features than any other Commodore file copier ever created.
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LETTERS to the editor

Send questions or comments to Letters to the Editor, **COMPUTE!'s Gazette,** *P.O. Box 5406, Greensboro, North Carolina 27403. We reserve the right to edit letters for clarity and length.*

64 on TV

After all the talk of the death of the 64, I was surprised to see a 64 on TV last night. On the Saturday-night show "Empty Nest" (NBC), there is a 64 and monitor at the nurse's station. It's nice to know that the little 8-bit machine is still around and on TV.

Larry Martin
Pensacola, FL

As you point out, Larry, the 64 is not dead, but it should be noted that NBC has unfortunately placed it in a hospital.

A Must for Sysops

I just finished reading "From the Other Side: Sysops Speak Out" (April), by Tom Netsel. I was really pleased to see that someone took the time to allow us sysops to speak. "The BBS 10 Commandments" is a must for all sysops to have posted on their systems.

Samuel D. Adams
Jacksonville, FL

Fair Count

A word of caution to *SpeedScript* users who may want to make a choice between Jim Butterfield's *Word Count* ("Machine Language for Beginners," February 1990) and Buck Childress's *SpeedCount* (June 1989). Since *Word Count* requires printing a *SpeedScript* document to disk as a sequential file, any header will be recounted at the top of each page. It therefore gives a higher tally than *SpeedCount*, which counts only one header in the command line. Moreover, *Word Count* counts hyphenated words as one, while *SpeedCount* treats hyphens as spaces. An example: For a 150-block document, *Word Count* returned 6731 words and *SpeedCount* gave me 6429, a 4-percent difference.

Richard van Frank
Montclair, NJ

Thanks, Richard. We should point out that SpeedCount *was written specifically as a* SpeedScript *utility. Jim Butterfield's* Word Count *was written as an example of how to use tables in machine language. While the program works well, its main purpose is to illustrate a technique.*

Tree-Tracing Software?

I've searched your pages and haunted software stores for many months and have yet to find a genealogy program for my 128/64. Can you help?

Roy N. Kelley
Hamilton, OH

Over the years, we've seen genealogy software for the 64, but we are not aware of any packages that are currently available. Our readers have been so helpful in detective work, we'll put this one to them.

Don't Slip with This Chip

What can you tell me about a video chip for the 128 that is present in the 128D? This chip is required, I am told, to run a program called *News Maker 128.*

John E. Risser
Markham, IL

The 128D features a 64K video RAM chip (versus the 128's 16K chip) that allows 640 × 200 hi-res graphics, and it's true that News Maker 128 *requires this extra video RAM. The expanded RAM chip—called the 4464—is available by mail order (check* Gazette's *ads) or from many Commodore dealers. Commodore strongly recommends that a skilled technician do the job since the old chips are soldered (not socketed) to the board. Several sources told us that the job is delicate and tedious.*

Connection Needed

I have a 64 and Star NX-1000C printer. I'd like to upgrade to an Amiga 500. Can I connect the printer to the Amiga?

Rob Gresham
San Leandro, CA

Representatives from Star Micronics told us that they know of no interface that will allow you to hook up your 1000C to an Amiga. They did, however, say that they've heard that some interfaces might work. If any of you readers have successfully used your 1000C printers with an Amiga or a PC, write and let us know.

Faster Yet

Your program *1581 FastLoader* [January] is great. I've been using it within the partitions on my 3½-inch drive with very good results. I wasn't too happy with the loading time, but I was pleased with the speed of operation after the program was loaded. I wondered if I could use the Fast Load cartridge to speed up *FastLoader.* Guess what? It works. Thanks for a great program.

Clyde R. Lovelace
Kilauea, HI

Safe Text

I have some text files in the *VIC Typewriter* program format. I tried to load the files into my 64. My machine locked up. Is there any way to transfer the files to a 64-compatible program?

Alan Shearer
Long Beach, CA

Since you're working with text files, you'll need to use a 64 program that's capable of reading them.

The ideal program for handling your VIC text files on the 64 is another word processor—preferably one that uses the same file format as VIC Typewriter. *Otherwise, you'll need to convert the text file to a format that can be read by another word processor.*

Although we're not familiar with VIC Typewriter, *our guess is that it saves text files in Commodore ASCII format. If you use* SpeedScript *to read these files, you'll need to copy them to disk and then convert them using the program* SpeedScript File Converter, *published along with* SpeedScript *(both in the magazine and on our* SpeedScript *disk).*

One last thing: Once you've successfully loaded a text file created with VIC Typewriter *into a 64 word processor, you may see unidentifiable characters in the text. These are probably* VIC Typewriter *formatting commands. Strip these out of the file and then add the corresponding commands used by the 64 word processor.*

Dollhouse

I noticed the dollhouse on your April cover—I have the same dollhouse in my home. The furniture in the house is beautiful. Can you tell me the name and address of the company that sells the furniture?

Helen Eger
Woodhaven, NY

The dollhouse and furniture on our April cover are courtesy of Toys & Co. The company will send a mail-order catalog on request. Write to Toys & Co., 401 Forum VI, Greensboro, North Carolina 27408. **G**

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d'iversions

Highways of the Future

Fred D'Ignazio

We are beginning the last decade of the twentieth century. For almost 50 years, we've regarded the computer as a data-processing device. Now it's time for us to discard this dangerously outdated image and create a compelling new image that will carry us into the twenty-first century.

Computer Teleportation

Who will ever forget the cry, "Beam me up, Scotty!" from the famous Star Trek TV and movie episodes? Wouldn't it be great if we could teleport ourselves around our world? Travel would be painless, cheap, and instantaneous.

The Enterprise's teleporter is no longer science fiction. It is reality.

We may not be able to teleport human bodies through space, but we can send vast bodies of information. And the result is the same: human travel—across cities, continents, and planets.

Welcome to the world of *virtual reality*—where humans can teleport their presences with the aid of the computer. A teleported presence—or *telepresence*—is already so common it's almost invisible. For example, a few minutes ago, I woke up and teleported Bryant Gumbel and Deborah Norville into my kitchen while I brewed coffee and warmed up a bottle for my baby. Right now, I'm sitting in my study where I have teleported Daniel Ortega to Michigan from Nicaragua. While I write this column, Ortega is actually in Managua, 10,000 miles away, talking about the future of the Sandinista Party after the recent elections.

Ortega, Gumbel, and Norville aren't physically in my house. But that doesn't matter. In a virtual world, all that matters is *effect*. If I pay more attention to them than to my wife, Janet, as she hurries around the house and out the door to work, then who is more real? Who is really here?

In fact, is "here" really here?

The Multiway Street

Over the next five years, personal computers will marry with video, TV, compact discs, and telephones. The result will be *multiway virtual reality*. Today, I can teleport the trio of Gumbel, Norville, and Ortega into my home, but I can't teleport myself back to them. The travel is one-sided. But not for long.

Think about the conversations TV journalists have with famous people scattered across the world. One person might be in Colombia, another in Japan, a third in Washington, D.C., and a fourth in New York. But we see them all at the same time in little windows on our TVs, and the journalist talks with them as if they were all in one room. What we're seeing is multiway virtual reality. All the participants are being teleported to each other simultaneously.

This process is soon going to be available to all of us. New fiberoptic lines are being installed that can carry voices, images, music, and computer data in any direction instantly across the planet. Meanwhile, new microchips are being fabricated that will compress all this information and further speed its transmission. The result, within five years, will be multimedia computers that can travel the optical highways of tomorrow and make virtual reality a participatory experience for all of us.

Bryant's Not Home

Bryant Gumbel is not likely to accept a *visit* from us. But there are plenty of other people who will. Plus the world we visit will not be as simple as a TV news program or someone's home. Instead, it will be a profoundly multiplexed virtual world where we're looking through various windows at the same time—some into the everyday world and some into "data" windows that look nothing like the real world.

News services in the future will be a lot more like MTV than CNN. Reporters around the world will feed stories—fast-breaking, dramatic stories and human-interest stories—into a giant multimedia data bank. At home we'll access the data bank through our multimedia computers. If we want, we can call up a story, tell it to fill the screen, and watch it to its conclusion.

But to most of us, this will be boring.

Instead we'll be multimedia channel-zapping. We'll call up several video windows simultaneously on the screen—or on multiple, flat screens pasted like video wallpaper on our walls. We may use four screens (grouped into a superscreen) to play back the main story—a student demonstration in Beijing, the marriage of two rock stars, the results of a pro soccer match. Meanwhile, we may play back the announcer's narrative on a fifth screen. We may "patch in" our best friend on a sixth screen and show her the video mosaic we're building. We may call up the *Guinness Book of World Records* on a separate screen and old documentary clips on still another screen.

We'll be able to control camera shots of everything we see. We can zoom in, zoom out, go to fisheye, wide angle, and extreme closeup. We'll have frame-by-frame control over audio and video. We'll be able to freeze-frame what we see, posterize, replay at fast speed, squish the image, or stretch it out. We'll be able to speed up the audio track, slow it down, change it to French, Japanese, or Russian—or have it signed by a humanlike computer agent who lives inside our machine.

And this is only the start. We can be recording this on read/write optical discs for later playback and for our own personal multimedia compositions. Or we might use all the information as raw data to create a 3-D computer simulation of a sports event, riot, birthday party, or revolution.

This new simulation is another level of virtual reality that we can enter or invite friends to enter with us. The friends may be in a physical room with us or in a virtual room made up of bodies scattered around the world.

Reach Out!

Think of all the world's optical and electronic communication channels as highways—electronic highways of the twenty-first century. Our multimedia computers will be vehicles we can ride to travel these highways.

What will travel these highways? Our mouths, our eyes, our ears—and our imaginations—as virtual telepresences. Some experts say that we may also be able to send our noses to smell places, events, meals, persons anywhere in the world; and our hands to touch fabrics, to feel heat, cold, velvet, and jagged rock.

And what will we touch? It will be partly real, partly artificial; partly physical and partly simulated; partly in real-time and partly in the past, the future, or in fantasy worlds that one person invents but many can share. **G**

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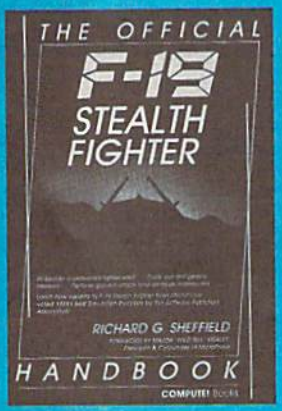

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Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, **COMPUTE!'s Gazette,** *P.O. Box 5406, Greensboro, North Carolina 27403. We regret that, due to the volume of mail received, we cannot respond individually to programming questions.*

Customizing the *Gazette Index* Disk

I just received a copy of the *Gazette Index* disk. I like it so much that I decided to use it to index the other five magazines that I subscribe to. But first, I need to change the preassigned items in the category field so that they match the articles of each magazine. I would be very grateful if you could tell me whether or not this is possible and, if so, how I'd go about doing it.

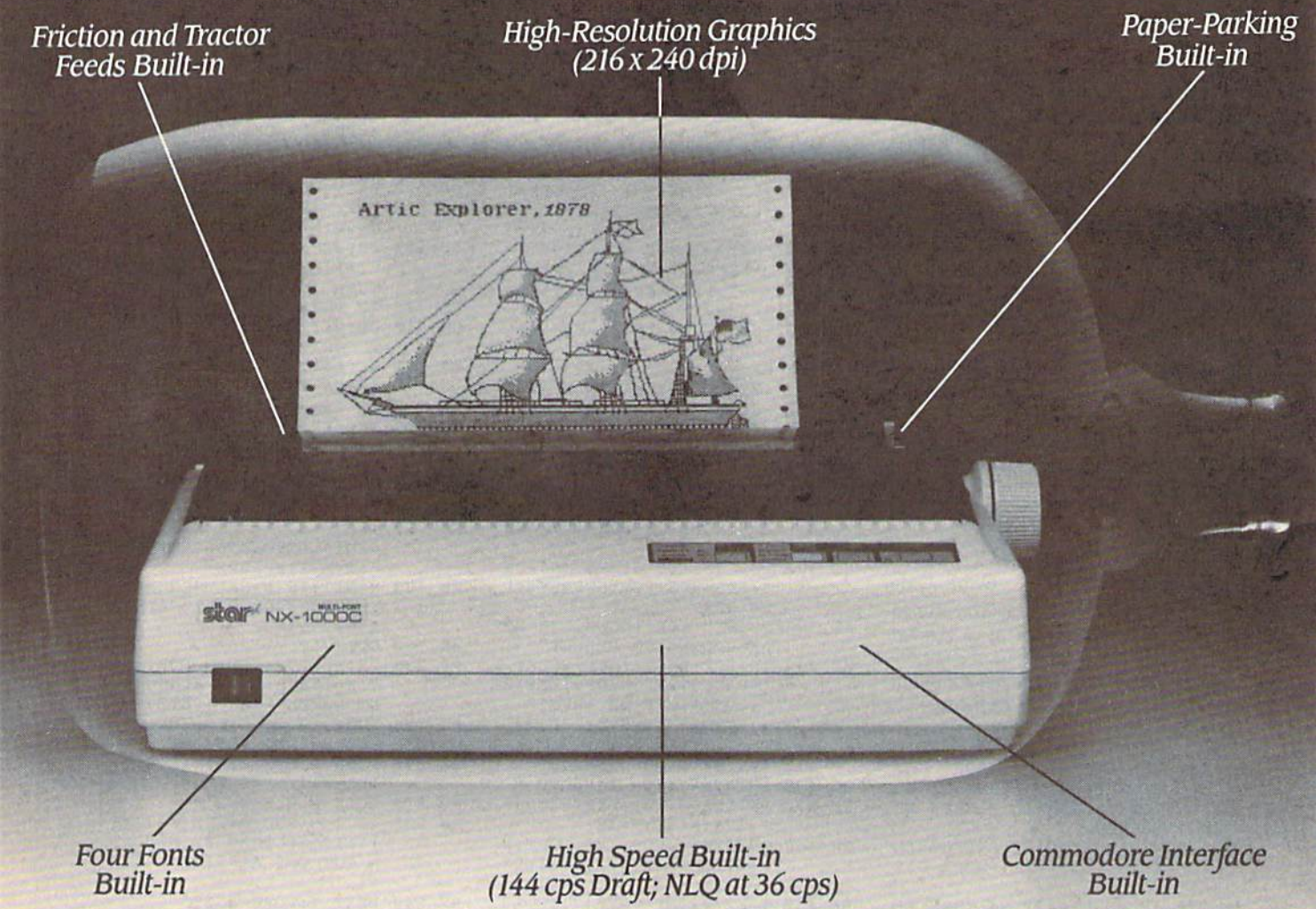
Yousef E. Ebrahim
Doha, Qatar

The indexer program on the Gazette Index *disk wasn't designed as a general-purpose database. As a result, it's not that easy to alter. However, the following program will allow you to change the categories.*

```
EP 100 REM COPYRIGHT 1990 COMP
       UTE! PUBLICATIONS, INC.
       {2 SPACES}ALL RIGHTS RE
       SERVED.
BK 110 REM CUSTOMIZE CATEGORIE
       S FOR GAZETTE INDEX DIS
       K
JE 120 IF PEEK(642)<96 THEN PR
       INT"MOVE BASIC FIRST: P
       OKE642,96:SYS58260":END
CB 130 PRINT"{CLR}COPYRIGHT 19
       90":PRINT"COMPUTE! PUBL
       ICATIONS, INC."
FJ 140 PRINT"ALL RIGHTS RESERV
       ED."
HG 150 IF A=0 THEN A=1:LOAD"TL
       ",8,1
MP 160 IF A=1 THEN A=2:SYS4915
       2
HA 170 IF A=2 THEN A=3:LOAD"IN
       DEX",8,1
AP 180 POKE53280,0:POKE53281,0
       :MX=40:DIM T$(MX)
KJ 190 C$="{CLR}":PRINTC$;CHR$
       (14)
JC 200 PRINT"{HOME}{2 DOWN}
       {CYN}CHOOSE OPTION"
EQ 210 PRINT"1. READ IN CATEGO
       RIES"
GD 220 PRINT"2. ADD/DELETE/EDI
       T CATEGORIES"
SA 230 PRINT"3. START FROM SCR
       ATCH"
XK 240 PRINT"4. SAVE CHANGES T
       O DISK"
QX 250 PRINT"5. EXIT"
KS 260 GETA$:IF A$="" THEN260
FF 270 A=VAL(A$):IF A=0 OR A>5
        THEN PRINTC$"PRESS 1-5
       ":GOTO200
CX 280 ON A GOSUB300,360,700,7
       90,920
AD 290 GOTO200
KC 300 B=18036:N=0:FOR I=0 TO
       {SPACE}MX:T$(I)="":NEXT
       :PRINT"{HOME}READING...
       "
XF 310 FOR B=18036 TO 18999
BX 320 C=PEEK(B):IF C=0 THEN N
       =N+1:IF PEEK(B+1)=255 T
       HEN350
FF 330 IF C THEN T$(N)=T$(N)+C
       HR$(C)
FG 340 NEXT
AR 350 PRINTC$;N;"CATEGORIES R
       EAD IN":N=N-1:RETURN
GC 360 IF T$(0)=""THEN PRINT"N
       O INFO, READ OR START F
       ROM SCRATCH":RETURN
BP 370 DN$="{DOWN}":RT$="
       {RIGHT}":LF$="{LEFT}":H
       $="{HOME}{3 DOWN}":H1=0
       :H2=0
GG 380 FOR I=1 TO 6:DN$=DN$+DN
       $:RT$=RT$+RT$:LF$=LF$+L
       F$:NEXT
AR 390 PRINT"{CLR}{DOWN}USE UP
        AND DOWN TO SELECT"
EF 400 PRINT"{RVS}I{OFF}NSERT
       {SPACE}{RVS}D{OFF}ELETE
        {RVS}A{OFF}DD {RVS}E
       {OFF}DIT {RVS}Q{OFF}UIT
       "
GF 410 T=N:IF N<20 THEN440
JC 420 PRINTH$;:FOR I=20 TO N
EQ 430 PRINTSPC(20);LEFT$(T$(I
       ),19):NEXT:T=19
RH 440 PRINTH$;:FOR I=0 TO T:P
       RINTLEFT$(T$(I),19):NEX
       T
BK 450 T=H2:PRINT"{OFF}";:GOSU
       B680
DA 460 T=H1:PRINT"{RVS}";:GOSU
       B680
MB 470 H2=H1
RB 480 GETA$:IF A$="" THEN510
QR 490 IF A$<>"{DOWN}" AND A$<
       >"{UP}" THEN530
XX 500 IF A$="{DOWN}" THEN H1=
       H2+1:IF H1>N THEN H1=0
PJ 510 IF A$="{UP}" THEN H1=H2
       -1:IF H1<0 THEN H1=N
KF 520 GOTO450
SF 530 IF A$<>"I" THEN570
AJ 540 IF N=MX THEN PRINT"
       {HOME}TOO MANY FOR INSE
       RT":GOTO450
CG 550 FOR I=N TO H1 STEP -1:T
       $(I+1)=T$(I):NEXT:N=N+1
AC 560 T$(H1)="":GOTO640
BR 570 IF A$<>"D" THEN600
EB 580 FOR I=H1 TO N-1:T$(I)=T
       $(I+1):NEXT:T$(N)="":IF
        N>0 THEN N=N-1
KQ 590 GOTO390
QA 600 IF A$<>"A" THEN630
MX 610 IF N=MX THEN PRINT"
       {HOME}TOO MANY FOR ADD"
       :GOTO450
JG 620 N=N+1:H1=N:T$(H1)="":GO
       TO640
GJ 630 IF A$<>"E" THEN660
HG 640 PRINT"{HOME}{2 SPACES}"
       ;T$(H1);
DC 650 INPUT "{HOME}";T$(H1):G
       OTO390
RH 660 IF A$<>"Q" THEN480
BP 670 PRINTC$:RETURN
XM 680 Y=T:X=0:IF Y>19 THEN Y=
       Y-20:X=20
SP 690 PRINTH$;LEFT$(DN$,Y);SP
       C(X);LEFT$(T$(T),19):RE
       TURN
RM 700 IF T$(0)="" THEN740
BM 710 PRINT"ERASE EXISTING CA
       TEGORIES (Y/N)?"
BX 720 GETA$:IF A$="N" THEN PR
       INTC$:RETURN
RK 730 IF A$<>"Y" THEN720
JB 740 N=0:PRINT"ENTER THE NEW
        CATEGORIES, BLANK TO E
       ND"
FA 750 T$(N)="":PRINT"C #";N;:
       INPUT T$(N)
SC 760 IF T$(N)="" THEN PRINTC
       $;N;"CATEGORIES ENTERED
       ":N=N-1:RETURN
KB 770 N=N+1:IF N>MX THEN N=N-
       1:PRINT"TOO MANY CATEGO
       RIES"
AK 780 GOTO750
RP 790 PRINT"POKING IN STRINGS
       ":B=18036:IF N=0THENPRI
       NT"NO ENTRIES":RETURN
EG 800 FOR I=0 TO N:T$=T$(I)
HE 810 FOR J=1 TO LEN(T$)
BQ 820 POKE B,ASC(MID$(T$,J,1)
       ):B=B+1:NEXT J
MB 830 POKE B,0:B=B+1
AH 835 IF I<N AND B+LEN(T$(I+1
       ))>18576 THEN PRINT"DAT
       A CUT OFF AT";I:B=B-1:N
       =I
RX 840 NEXT I:POKE B,255
KH 850 POKE 7178,N:POKE 5297,N
       :POKE5303,N-1:POKE7184,
       N-1
CC 860 SYS49155:PRINT:PRINT"SC
       RATCHING OLD INDEX"
CH 870 OPEN15,8,15,"S0:INDEX":
       CLOSE15
GM 880 PRINT"SAVING NEW INDEX
       {5 SPACES}"
PB 890 OPEN1,8,1,"0:INDEX"
BR 900 POKE 193,1:POKE 194,8:P
       OKE174,0:POKE 175,80
KE 910 SYS 62957:CLOSE1:PRINTC
       $"DONE":RETURN
MS 920 PRINTC$"SYS2061":PRINT"
       TO TRY NEW INDEX":PRINT
HK 930 PRINT"GOTO145":PRINT"TO
        REENTER EDITOR"
GA 940 END
```

Before you start, make a backup copy of your index disk using a file-copier program. Then, type in and save the above customizer program on the backup disk. Next, move up the start-of-BASIC by entering POKE 642,96:SYS 58260 in direct

The new Star Multi-Font. How did Star get it all in there?


Friction and Tractor Feeds Built-in
High-Resolution Graphics (216 x 240 dpi)
Paper-Parking Built-in
Artic Explorer, 1878
star NX-1000C
Four Fonts Built-in
High Speed Built-in (144 cps Draft; NLQ at 36 cps)
Commodore Interface Built-in

It wasn't easy. But, we built an incredible number of features into the Star NX-1000C Multi-Font™. So now you and your Commodore can be as creative as you like.

The best feature in this new Star printer is built into its name—Multi-Font. It has four built-in type fonts that give you twenty different print style options. Just mix these fonts in with its high-resolution graphics to make great looking reports, greeting cards, posters—whatever you want.

And the list of built-in features goes on—there's impressive speed in both draft and near letter quality. And an automatic single sheet feed. Plus, a paper-parking mechanism that lets you use single sheets without removing tractor paper. And the Multi-Font's easy-to-use push button control panel gives you command of over thirty-five functions.

Whether it's for serious work or serious play, the Star NX-1000C Multi-Font has so much built-in, you'll get more out of your Commodore. To find out where you can see the Multi-Font, call 1-800-447-4700.

star micronics

The ImagePower™ Printers

Multi-Font printout produced by Flexidraw 5.5 graphics software by Inkwell Systems.

Circle Reader Service Number 109

BASIC for beginners

More on Timers

Larry Cotton

Last month we began a rather unstructured reaction-timing program that used the Commodore 64's not-so-accurate jiffy-clock timer. This month we'll finish our study of TI and TI$ and look at a more accurate timer within the Commodore 64.

Recall that our program prints a series of horizontal bars on the screen. While each is being printed, the user must press the space bar to indicate how quickly he or she reacts to the appearance of the bar(s).

Lines 10–180 of this program were given in last month's column. You'll recall that we'd displayed the first bar and timed the user's reaction by reading the timer-specific variable TI. The bar counter D had been incremented but was still less than the number of bars the user requested at the beginning of the program (NB). To make the display more interesting, let's alternate between red and cyan bars.

```
190 IF FL=0 THEN FL=1:PRINT
    "{RED}";:GOTO 210
200 FL=0:PRINT "{CYN}";
```

These two lines illustrate the use of a flag—in this case, FL—to toggle between two colors. Now we need another random-length delay between printing the colored bars. As noted last month, this prevents the user from anticipating when a bar will be printed, thus falsely improving his or her reaction times.

```
210 FOR U=1 TO INT(200*RND(1))+20
    :GET B$:IF B$< >"{SPACE}" THEN
    NEXT:GOTO 110
```

At the end of the random-length delay, control is sent back to print a new bar and the clock is reset. If the user jumps the gun and presses the space bar before seeing anything, a glaring message is printed.

```
220 IF B$="{SPACE}" THEN PRINT
    "{WHT}{DOWN}TOO SOON!"
```

The next line resets D (number of bars printed), TL (total reaction time), and FL (color flag) and returns the user to ground zero. Such is the penalty for pressing the space bar too soon (line 220) or not pressing it soon enough (last month's line 130).

```
230 D=0:TL=0:FL=1:GOTO 80
```

The last five lines of the program are called from line 180, which detects when the number of bars printed (D) equals the user's request (NB).

```
240 AV=TL/D:AV=INT(AV*100+.5)
    /100
250 PRINT "{WHT}{DOWN}AVERAGE
    REACTION TIME ="AV"SEC."
260 IF AV<BT THEN PRINT "{DOWN}
    BEST TIME ="AV"SEC.":BT=AV
    :GOTO 230
270 PRINT"{DOWN}BEST TIME ="BT
    "SEC."
280 GOTO 230
```

The variable AV is the average reaction time for the series of bars, rounded to two decimal places. In line 260, we compare it to BT (defined hypothetically as 100 in line 10), to track the user's best reaction time. If AV is less than BT, then the new BT is equal to AV. Otherwise, BT doesn't change and is printed by line 270.

Try running the program a few times until you achieve your best reaction time. Compare it to a friend's. I usually average about .22 seconds; youngsters invariably do much better than that.

TI and Music

Since the Commodore 64 is so gifted musically, and since it contains the easy-to-use jiffy-clock timer, let's look at how TI can be useful in timing musical-note durations. Enter the following short program, which plays a musical scale. In lieu of a line-by-line explanation, REMs will be used to let you know what's going on.

```
10 M=256:D=10:REM MULTIPLIER
   AND DURATION
20 J=54272:FOR K=J TO J+23:POKE
   K,0:NEXT:REM CLEAR SOUND CHIP
30 POKE J+24,15:REM FULL VOLUME
40 POKE J+3,8:REM VOICE 1 SQUARE
   WAVE
50 POKE J+5,15:POKE J+6,12:REM
   VOICE 1 ENVELOPE
60 READ X
70 X1=INT(X/M):X2=X-X1*M:REM
   CALCULATE POKEABLE FRE-
   QUENCY VALUES
80 POKE J+1,X1:POKE J,X2:REM VOICE
   1 FREQUENCY VALUES
90 POKE J+4,65:REM TURN NOTE ON
100 T=TI+D:REM READ TI, ADD
    DURATION
110 IF TI< >T THEN 110:REM LOOP
    UNTIL NEW TI = SUM OF OLD TI
    + DURATION
120 POKE J+4,64:IF X=0 THEN END
    :REM TURN NOTE OFF
130 GOTO 60:REM GO BACK FOR
    ANOTHER NOTE
1000 DATA 4291,4817,5407,5728,6430,
     7217,8101,8583,0:REM FROM PROG.
     REF. GUIDE
```

You've seen most of these techniques in the columns on 64 music, except for the use of TI in lines 100–110. Here's how they work.

The note is turned on in line 90. We read *two values* of TI in lines 100 and 110. Duration D (defined in line 10) will be added to the first value. Then, in line 110, the second value of TI will be compared to T. If they're not equal, the program loops at line 110, reading more and more values of TI until TI is equal to T. When this occurs, the program falls through to line 120, which turns the note off.

Try changing the value of D in line 10 to other values from 1 to 500 and observe the results.

The Good-Timer

As mentioned in the May column, the Commodore 64 has accurate and not-so-accurate timers. We've seen how the latter works, so let's now take a look at the accurate one—the Time of Day (TOD) clock. Actually, there are *two* TOD clocks built into the 64. Ironically, they count in tenths of seconds instead of sixtieths, as does the jiffy clock.

What makes the TOD clocks more accurate than the jiffy clock? For one thing, the jiffy clock is interrupted by cassette saves and loads and can even vary from one computer to another. (My jiffy clock loses about two seconds a day.) The TOD clocks, on the other hand, are as accurate as the 60-Hz frequency of the power line that your computer is plugged into.

Even though they don't need TI and TI$ to operate, the TOD clocks are still programmable using BASIC commands that we've already learned. We'll access the TOD clock, which uses memory registers 56328–56331. (The other uses registers 56584–56587 and is accessed similarly.) To set the clock, values must be POKEd into the four time registers which follow.

mode. The BASIC start-up message will appear showing 16383 bytes free; this gives you enough memory for the program INDEX and a patch.

Now, load and run the customizer program. The customizer has five menu options. To choose a particular option, press the number key corresponding to the option. Option 1 reads the existing categories into an array. Option 2 lets you edit the categories. Option 3 is used for starting a new database with entirely different categories. Option 4 saves and replaces the program INDEX. And option 5 exits the program.

If you want to index magazines other than Gazette, *select option 3. Then, enter your new categories one at a time. When you've finished, press RETURN. To view and edit the categories you've just entered, select option 2.*

Option 2—Add/Delete/Edit categories—displays up to 40 categories. Use the cursor-up and -down keys to move the flashing highlight bar through the categories. The commands available in this mode are I, to insert a category; D, to delete one; A, to add another category onto the end; E, to edit the highlighted category; and Q, to quit to the main menu.

Only the first 18 characters of each category are displayed on the screen, but the entire entry is stored in memory. There are about 500 bytes of memory for categories within the INDEX program. The actual categories used in INDEX take up about 460 bytes. If you enter more than 500, the program cuts off some of your data when you save a new version.

When you've finished editing the categories, select option 4 from the main menu to create a new version of INDEX. When you boot the disk, this new version is loaded. The new program won't be compatible with old data files. In fact, the program may crash if you load in old files and have fewer categories. For this reason, you should dedicate a disk to each magazine or set of categories.

In case you need to manipulate the data files, the first character of each filename is CTRL I. If you have trouble typing that in, use a question mark for the first character. (For example, you could use the commands OPEN1,8,15,"S0:?REVIEWS 83-85":CLOSE1 to delete the 1983–1985 reviews data file.)

After selecting option 5 to exit the program, enter SYS 2061 to try the new INDEX program or enter CONT to return to the customizer (in case you accidentally exit). Note that you can't save INDEX after using this SYS.

The customizer uses the turbo loader included on the index disk. If the program has trouble loading in INDEX with this loader, just delete the command SYS 49152 in line 160.

A 128 Musical Discovery

For owners of a Commodore 128 or 128D, there is some music hidden away on the tutorial disk that is supplied with your machine. To access it, you'll have to follow the directions here.

1. Insert your C128 Tutorial Disk.
2. Type BLOAD"128MUSIC",B0,P32768 and press RETURN.
3. Enter BANK0:SYS8*4096+3,0,1 for the Commodore theme song.
4. Enter BANK0:SYS8*4096+3,1,1 for the song used in the Demo program.
5. Enter BANK0:SYS8*4096+3,2,1 for the *William Tell* Overture (the theme song from "The Lone Ranger").

Also, by substituting a 0 (instead of a 1) for the last number in the above SYS commands, the music will play continuously.

David W. Ferguson
Pontomac, MS

Thanks for revealing this nifty find. G

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

BASIC for Beginners

Function	Register
Hours/a.m./p.m.	56331
Minutes	56330
Seconds	56329
Tenths of Seconds	56328

Then, to read the clock, we PEEK these same registers and print out what's there.

A Simple but Accurate Clock

Here's a short program that uses the TOD clock to display the time, accurate to a tenth of a second, on the screen. Each second that passes is accompanied by a satisfying tick sound. Unlike similar machine language clocks, you can't do anything else while this clock is displayed. At the same time, though, it's educational. Again, instead of a line-by-line explanation, I'll just use REMs to explain briefly what's going on.

```
10 FOR J=54272 TO 54295:POKE
   J,0:NEXT:REM CLEAR SOUND CHIP
20 POKE 54275,8:POKE 54296,15:REM
   SQUARE WAVE AND FULL
   VOLUME, NO ADSR FOR TICK
30 POKE 54273,100:REM SET TICK
   PITCH. TRY OTHERS
40 INPUT "{CLR}{WHT}{DOWN}
   HOURS";T(1):IF T(1)>12 THEN 40
50 INPUT "{DOWN}MINUTES";T(2):IF
   T(2)>59 THEN PRINT "{3 UP}"
   :GOTO 50
60 INPUT "{DOWN}SECONDS";T(3):IF
   T(3)>59 THEN PRINT "{3 UP}"
   :GOTO 60
99 REM LINE 100 CALCULATES
   POKEABLE VALUES FOR THREE
   TIME-OF-DAY MEMORY
   REGISTERS
100 FOR I=1 TO 3:H=INT(T(I) /10):L=
   T(I)-10 *H:T(I)=16*H+L:NEXT
110 C=56331:REM TOP OF FOUR TOD
   REGISTERS
120 POKE C,T(1):POKE C-1,T(2):POKE C-
   2,T(3):REM FILLS TOP THREE
   REGISTERS
130 PRINT "{DOWN}PRESS ANY KEY
   TO START CLOCK."
140 GET A$:IF A$="" THEN 140
150 PRINT "{CLR}"
160 POKE C-3,0:REM STARTS CLOCK
169 REM LINES 170-240 FORM LOOP
   WHICH REPEATEDLY READS THE
   FOUR MEMORY REGISTERS
170 H=PEEK(C):M=PEEK(C-1):S=PEEK
   (C-2):T=PEEK(C-3):REM READING
   THE REGISTERS
180 C1$=CHR$((16 AND H)/16+48)+
   CHR$((15 AND H)+48):REM
   FORMING HOURS STRING
190 C2$=CHR$((240 AND M)/16+48)+
   CHR$((15 AND M)+48):REM
   FORMING MINUTES STRING
200 C3$=CHR$((240 AND S)/16+48)+
   CHR$((15 AND S)+48):REM
   FORMING SECONDS STRING
210 IF C3$=C4$ THEN 230:REM IF NOT
   THE SAME, PRINT TIME & SKIP
   SOUND SUBROUTINE
220 GOSUB 300:C4$=C3$:REM C3$
   <>C4$, THEREFORE SOUND TICK,
   MAKE C4$=C3$ AGAIN
230 PRINT "TIME IS "C1$+":"+C2$+"
   :"+C3$+":"T"{UP}":REM PRINT
   TIME, CURSOR UP
240 GOTO 170
300 POKE 54276,65:POKE 54276,64:
   RETURN: REM TURNS SOUND ON
   AND OFF QUICKLY
```

Enter the program and save it to tape or disk. When you run it, you're asked to enter three values to set the clock. After doing this, you press any key to start the clock. The values that you enter can range from 0–12 for hours and 0–59 for minutes and seconds. Once you press a key to start the clock, the program converts the numbers which were entered to those which the TOD clock registers can use.

This is not a 24-hour clock, and it doesn't distinguish between a.m. and p.m. And it's not necessary to enter any of the values as two digits. For instance, if it's 1:06 p.m., at the three input prompts, just type 1, 6, and then press RETURN. Then press any key to start the clock. Set it with a known accurate electric clock and let it run a while. You'll see that it doesn't vary even slightly from correct time. G

THE programmer's page

Printer Spooling

Randy Thompson

"The Programmer's Page" is interested in your programming tips and tricks. Send all submissions to The Programmer's Page, COMPUTE!'s Gazette, *P.O. Box 5406, Greensboro, North Carolina 27403. We'll pay $25–$50 for each tip we publish.*

In January, I announced a contest of sorts. The contest focused on a somewhat strange program that read ASCII text files from disk and output them to the printer. Nothing odd about that, of course, except that the disk drive and printer didn't need to be connected to the computer once the printing began. In fact, as long as the disk drive remained tethered to the printer, you could disconnect the computer from the disk drive and turn it off—the file would continue to print. (A more practical person might opt to run another program during this unexpected free time.)

All weird programs have their quirks, however, and mine had plenty. Mainly, it didn't work with all printers. And that was my challenge. I offered $50 to the first person who could make the program work with *all* Commodore-compatible printers and $75 to the first person who could do that *and* make it work on both the 64 and 128 (my version ran on the 64 only).

I'm sad to say that I have yet to receive a winning entry; I have yet to receive more than *four* entries. A couple of people wrote in claiming that the whole idea of a background printer spooler was preposterous, attaching listings of tried-and-true BASIC FOR-NEXT loops that printed characters from disk one by one. But those people failed to realize the goal.

One person knew exactly what I wanted. Ted Grondski of the Pioneer Valley Computer Club in Springfield, Massachusetts, has sent me more printer spoolers than I know what to do with. Each one is based upon—but a greatly improved version of—the program that I had originally published.

Unfortunately, Mr. Grondski's programs are limited to the same printers and printer interfaces as my original program, so technically, his spoolers are not contest winners. But because of his efforts, I'm awarding Mr. Grondski $40 and presenting his best here.

Ted Grondski's most important improvement to the printer spooler is that the program now runs on both the 64 and the 128. It's also completely relocatable—just change the value assigned to the variable A in line 120. The starting address must be set to a number that is evenly divisible by 256.

Mr. Grondski's improved printer spooler is listed below. After running the program, you can print text files by entering the command **SYS 15872:*"filename",device#***, where *filename* is the name of a sequential ASCII file and *device#* is the device number of your disk drive (usually 8 or 9). If you own one of the printers compatible with the program, the drive will whir and the printer will print the specified file. Best of all, you are free to use the computer while the file continues to print.

```
JH 10 REM PRINT SPOOLER 64/128
      (RELOCATABLE)
HC 20 REM BASED ON AN ODD IDEA
      BY RANDY THOMPSON
BJ 30 REM THE PROGRAMMER'S PAG
      E
MK 40 REM COMPUTE!S GAZETTE JA
      NUARY 1990
FK 50 REM ENHANCED BY TED GRON
      DSKI 2-24-90 V5.1D
JB 60 REM PIONEER VALLEY COMPU
      TER CLUB
CA 70 REM 1265 ST. JAMES AVE.
DR 80 REM SPRINGFIELD, MA 0110
      4
MH 90 REM
RC 100 REM RELOCATE BY CHANGIN
       G 'A' TO
PX 110 REM AN AVAILABLE MEMORY
        PAGE-START.
CA 120 A=15872
KR 130 H=INT(A/256):J=328
HS 140 IF A-H*256>.1 THEN PRIN
       T"{RVS}'A' MUST BE A MU
       LTIPLE OF 256.":LIST120
       :STOP
XA 150 PRINT"{CLR}{2 DOWN}
       {RVS} WAIT... POKING DA
       TA. "
RM 160 FOR X=0 TO J:READ D:C=C
       +D
RS 170 POKE A+X,D:NEXT X
PD 180 POKE A+16090,H:POKEA+15
       949,H+1
GJ 190 IF C<>42905 THEN PRINT"
       {DOWN}{RVS} DATA ERROR.
       .. ":STOP
EE 200 Q$=CHR$(34):S$=":"+Q$+"
       FILENAME"+Q$+",DV"
AK 210 A$=STR$(A):A$=MID$(A$,2
       )
QQ 220 PRINT"{CLR}{2 DOWN}
       {RVS} SYNTAX:{OFF} SYS"
       A$S$:END
QG 230 DATA 169,0,44,252,255,1
       6,27,133,254,32,115,0
AG 240 DATA 201,34,240,12,36,2
       54,48,5,162,11,76,55
PD 250 DATA 164,76,131,76,32,2
       12,225,24,144,17,9,128
BA 260 DATA 133,254,32,128,3,2
       01,34,208,227,32,174,14
       5
DR 270 DATA 32,69,168,165,183,
       240,217,224,8,144,213,2
       24
JE 280 DATA 12,176,209,134,176
       ,133,177,165,187,133,17
       8,165
JP 290 DATA 188,133,179,162,60
       ,160,63,169,5,32,189,25
       5
HB 300 DATA 36,254,16,5,162,0,
       32,104,255,169,19,166
SQ 310 DATA 176,160,15,32,186,
       255,32,192,255,176,43,1
       69
JX 320 DATA 19,32,195,255,162,
       65,228,187,240,50,165,1
       77
EX 330 DATA 166,178,164,179,32
       ,189,255,36,254,16,5,16
       2
RC 340 DATA 1,32,104,255,169,1
       7,166,176,160,2,32,186
JC 350 DATA 255,32,192,255,144
       ,20,72,32,231,255,104,1
       70
CA 360 DATA 36,254,48,3,76,55,
       164,76,124,77,208,165
MM 370 DATA 240,77,169,0,32,18
       9,255,169,18,162,4,160
GE 380 DATA 7,32,186,255,32,19
       2,255,176,217,162,18,32
XJ 390 DATA 201,255,176,210,16
       2,17,32,198,255,176,203
       ,162
KE 400 DATA 255,202,208,253,17
       3,0,221,41,223,141,0,22
       1
JH 410 DATA 162,249,160,62,120
       ,142,20,3,140,21,3,169
EB 420 DATA 0,133,252,133,251,
       198,251,88,169,0,133,15
       3
XA 430 DATA 169,3,133,154,96,2
       08,175,240,51,36,251,16
PM 440 DATA 53,173,0,221,197,2
       53,208,40,230,252,165,2
       52
CP 450 DATA 201,120,208,38,230
       ,251,32,204,255,162,18,
       32
RG 460 DATA 201,255,169,13,32,
       210,255,169,18,32,195,2
       55
XC 470 DATA 169,17,32,195,255,
       32,204,255,162,65,208,2
       01
MP 480 DATA 133,253,169,0,133,
       252,36,254,48,3,76,49
DD 490 DATA 234,76,101,250,85,
       48,62,77,48,85,48,62
EB 500 DATA 77,49,0,0,0
```

G

machine language programming

Split Screen

Jim Butterfield

The Commodore 128 gives you a built-in screen-splitting feature, but on the 64 you must do the job yourself. This task involves careful use of the IRQ interrupt.

The accompanying program gives an example of screen-splitting code for the 64. If you can locate a copy of *COMPUTE!'s First Book of Commodore 64* (published in 1983), you'll find this information in more detail there. We'll work through the program I wrote for the book (it appears on page 102) and look at how it works.

First, an outline of our objectives. The image on the television or monitor screen is continuously being drawn; the *raster*, which draws the image, runs from the top to the bottom of the screen, taking 1/60 second to draw the whole thing. Our program must "catch" the 64 at the exact moment the raster-drawing process reaches the split point and then change the screen to some other mode: from text to high resolution, from one background color to another, and so on. The job must be done fast enough that the user sees no flicker in the screen image.

Furthermore, we must arrange to restore our video when the raster drawing completes the bottom of the picture and returns to the top of the screen. That requires two interrupt timings: one to switch and another to switch back.

While all this is going on, another interrupt needs to be serviced: the one that polls the keyboard, flashes the cursor, and updates the clock. This routine must also be serviced at intervals of 1/60 second, but not necessarily at precisely the same speed as our video interrupt. In fact, part of our problem is that the two activities are not synchronized. Sometimes their timing will coincide and other times it will be far apart.

Priority

Our first approach might be to write the program this way: If the two IRQ interrupts occur at the same time, we'll always do the screen-split job first. That job is time-sensitive, and the keyboard/clock work won't mind a short delay. The screen split will take precedence, giving us the fast timing we need. Right? Wrong.

Here's the problem. Suppose that the regular interrupt—the keyboard/clock job—comes a split second before the video chip signals it's ready. The computer will start to service the keyboard, and the next interrupt can't be handled until the previous one is finished. Checking the keyboard, updating the clock, and doing the other tasks (blinking the cursor, checking the RUN/STOP key, and maintaining the cassette tape interlock) will take too long. By the time they finish, we will have missed our screen-split point and the viewer will see a bounce, or flicker, in the dividing line.

We must use a different approach to the problem—one that at first seems radical. We disconnect the regular interrupt completely. The only interrupt will be that for the screen split. And the code there will ask, "Is the regular routine requesting service?" If so, that routine is serviced after the screen split has taken place.

How can we detect an interrupt request if we've shut off a particular interrupt? The answer lies in two important registers: the IER (Interrupt Enable Register) at $D019, which switches an interrupt request through to the IRQ line if activated; and the IFR (Interrupt Flag Register) at $DC0D, which tells us if an interrupt is being requested by that particular event—even if the interrupt is not "cut through."

The Machine Language

Our routine makes a simple background color change at the screen-split point. By the time this code is activated, BASIC will have switched off the regular interrupt line.

```
033C  LDA  #$01    ;turn off raster
                     interrupt...
033E  STA  $D019   ;...via IER
0341  LDX  #$92    ;raster int = $92
0343  LDY  #$06    ;color blue
0345  LDA  $D012   ;test raster
0348  BPL  $034E   ;skip if at top of
                     screen
034A  LDX  #$01    ;raster int = $01
034C  LDY  #$00    ;color black
034E  STX  $D012   ;set next IRQ
0351  STY  $D021   ;change color
```

The above code does the actual screen-split work. Now it's time to see if the disabled interrupt is asking for service.

```
0354  LDA  $DC0D   ;test IER
0357  AND  #$01    ;extract timer bit
0359  BEQ  $035E   ;skip if no request
035B  JMP  $EA51   ;do timer service
035E  JMP  $FEBC   ;exit interrupt
```

This routine is as streamlined as I can make it. In many cases, you'll need to expand the code. For example, you might need to set (and test) both the high and low parts of the raster register. One secret that I didn't mention in the original article: The IRQ startup code in ROM, together with the above, run in a time that almost exactly matches the time needed to draw one raster line. As a result, the color change will take place one raster line lower than the one it seems you're setting.

Let's do the program in BASIC so that you can see the entire job.

```
90 POKE 53265,27:REM DEFAULT
   SETTING
100 FOR J=828 to 864:READ X
110 T=T+X:POKE J,X
120 NEXT J
130 IF T<>4077 THEN STOP
200 DATA 169,1,141,25,208,162,146,160,6,
   173,18,208,16,4,162,1
210 DATA 160,0,142,18,208,140,33,208,173,
   13,220
220 DATA 41,1,240,3,76,49,234,76,188,254
300 POKE 56333,127:REM DISCONNECT
   REGULAR IRQ
310 POKE 788,60:POKE 789,3
320 POKE 53274,129:REM CONNECT
   RASTER IRQ
```

To handle interrupts, you must grasp some new programming ideas. And you must be careful. Interrupt code is hard to debug, so it helps to get it right the first time. **G**

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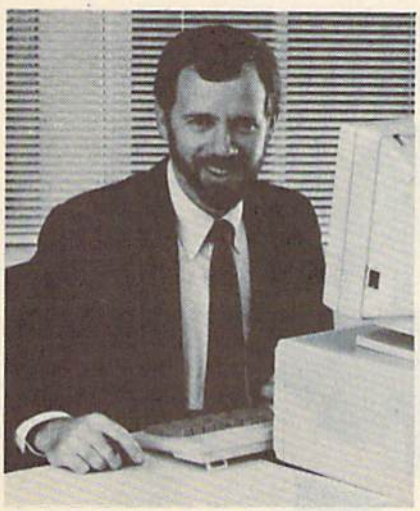

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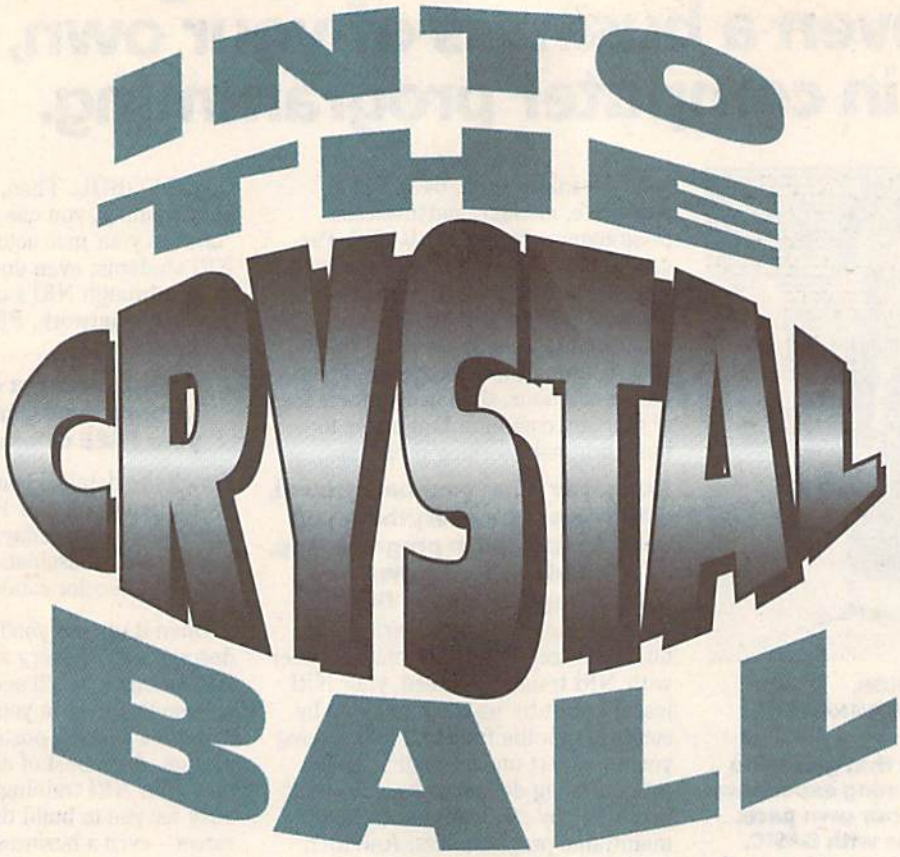

Software Leaders' Outlook on the 64

Mickey McLean

"The Commodore 64 is dead."

Industry experts uttered this phrase four years ago and two years ago. Many continue to say it today. You'll probably hear it again two years from now.

Introduced during the summer of 1982, the Commodore 64 has inspired more repetition of Mark Twain's famous quotation than any other product of the computer industry. Despite a lack of support from its parent company and a growing list of software developers abandoning it in favor of MS-DOS, Amiga, Nintendo, and Sega formats, the 64 has become the computer that won't die.

> The reports of my death are greatly exaggerated.
> —*Mark Twain (1897)*
>
> **The obituary has long been written for the Commodore 64, but many software publishers continue to find good reason to support the machine. Here's what they say.**

Although PCs and compatibles claim close to 80 percent of the software market, several software companies that have stuck with the 64 report steady sales.

"While a lot of pundits have predicted the demise of the 64, we're still finding it's a strong platform," says Martin Alper, president of Virgin Mastertronic, which produces arcade and sports simulations for the 64. "Our 64 sales are running neck-

and-neck with IBM.

"You would have expected Nintendo and Sega to have knocked the feet out from under the 64," he says. "They have eroded the market, but not as much as forecasters had predicted."

A major producer of sports simulation titles is SportTime Computer Software—and President Ed Ringler is pleasantly surprised at how well the company's 64 releases are selling.

"*Omni-Play Basketball* is one of the leading titles at Electronic Boutique," Ringler says, "and the people there are surprised, too.

"I haven't noticed IBM users being any more aggressive than Commodore 64 users," he says, comparing the buying habits of PC and 64 users. "We'll keep putting out 64 products as long as they are aggressive."

Until recently, the top-selling platform for Strategic Simulations (SSI) was the Commodore 64.

"*Champions of Krynn* is the first product where the MS-DOS initial order was greater than the 64," says marketing representative Linda Blanchard about SSI's latest Advanced Dungeons & Dragons release. "We're starting to see a change. But our product line is still very popular with 64 owners, especially the AD & D products. And as long as people out there keep buying them, we'll keep making them."

Less Competition

One reason that companies such as Virgin Mastertronic, SSI, and SportTime are able to maintain a strong presence in the 64 market may be reduced competition.

"Because other publishers have dropped out, maybe we're getting a larger slice," Alper says.

Many of the major software companies have scaled back their 64 releases, have stopped support altogether, or have limited 64 releases to the European market.

"We have nothing under development now," says Lisa Petrison, public relations coordinator for Mindscape. "It just hasn't been profitable enough."

Petrison did add that one of Mindscape's recent titles, *Fiendish Freddie's Big Top o' Fun*, was released for the 64, but only in Europe, where Mindscape finds the market more to its liking.

According to Joe Hubbard of Free Spirit Software, foreign users are slower to make a change than their U.S. counterparts.

"In certain countries such as the U.K. and Australia, users tend to run their machines longer," Hubbard says. "They don't upgrade as easily, and some simply find the 64 is all they need."

Although Hubbard is a longtime 64 and 128 supporter, he has decided to concentrate on the Amiga market.

"I doubt we'll introduce any new products for the 64, but we'll continue to support existing products," says Hubbard, who notes that there's still a great demand for Free Spirit's 1541/1571 drive alignment program.

"I guess as disk drives get older, there is a greater need for the product."

Quality, Not Quantity

Other software companies have discovered that the 64 user of today is more discerning than ever.

"Commodore users are a very distinct breed," says Greg Malone, media relations manager for Origin, another company that continues to develop 64 products. "They have pride in their machines, and they hate conversions from other machines."

Ringler adds, "Without a doubt, quality is going to be the winning issue. In the long run, a product will succeed because it is a good product."

But with Nintendo and MS-DOS products eating up shelf space in stores, Ringler and other developers are finding it increasingly difficult to get a product to market.

Shelf Wars

Kyodai Software Marketing, a newcomer to the Commodore market, is owned by 12 different Japanese software manufacturers. The company recently released an arcade title, *Curse of Babylon*, in the U.S. for the 64.

"They [Japanese manufacturers] were interested in testing their products in the Commodore market," says John Eaton, chief executive officer of Kyodai. "We determined that Commodore owners may be happy with a Nintendo-type game."

Although it's too soon to determine how well the product is faring, Kyodai has had problems with distribution. "Certain distributors will not take Commodore products," Eaton says.

It will go away unless publishers exploit the 64's capabilities instead of just making a quick port.

—Martin Alper, Virgin Mastertronic

Despite this knowledge, Malone adds that Origin has recently started developing all of its games, with the exception of *Bad Blood*, on the IBM PC first. *Bad Blood* is derived from *Times of Lore*, which was initially developed for the 64. Since a new game could be built from the old, Malone says Origin decided to co-develop it on both the 64 and on a PC.

In addition to Origin, companies such as Mediagenic, Accolade, and Electronic Arts are concentrating on the PC market first and foremost and later porting some of the titles over to the 64.

Virgin Mastertronic's Alper says, "It [the 64] will go away, unless publishers exploit the 64's capabilities instead of just making a quick port."

Based on the experiences of companies that still develop primarily for the 64, the formula for success in today's market is quality equals sales.

SportTime's Ellen Horiuchi says, "When we come out with a good 64 product, people seem to eat it up!"

SportTime's Ed Ringler feels for the 64 users who must hunt down new software for their computer.

"It is definitely harder for the end user," Ringler says. "A lot of decisions are already made for them."

Ringler understands the retailer's dilemma over whether to sacrifice shelf space for 64 products in order to make room for Nintendo cartridges.

"Retailers usually end up having to choose Nintendo," he says. "At least there is no piracy with Nintendo. But if the stores carry 64 products, the products are going to sell."

Babbage's, one of the largest national software retail chains, continues to carry 64 products, but company President Gary Kusin is not very optimistic about the future.

"Unfortunately, it looks like the 64's fate is sealed," Kusin says. "But we'll continue to carry 64 products as long as they're available."

Kusin attributes the lack of Com-

modore titles on the shelves to the boom of the Nintendo market as well as the declining interest of software publishers to develop 64 products.

"It's less our decision and more the decision of publishers who have quit making products," he says.

Kusin adds that 64 titles coming into the stores have not sold well.

Berkeley's Solution

Berkeley Softworks, publisher of the immensely popular GEOS, has noticed mass merchants cutting back on shelf space for its line of 64 productivity software. Leland Llevano, Berkeley's vice president of marketing, indicates that the company is experimenting with new ways to market its products.

"We need to be prepared," Llevano says. "We have had a lot of success with direct mail, and with it we can offer price incentives because we won't have to offer discounts to distributors or retailers."

The software companies create the demise of hardware. Just like the Atari 800. When people stopped making any products, it died.

—Ed Ringler, SportTime Software

Llevano is quick to add that Berkeley does not plan to compete head-to-head with retailers. "We'll only go to this when the shelf space shrinks."

As for the future of GEOS, Llevano says that no new applications are planned but that a system upgrade is in the works for release next fall.

"We feel as if we have hit on most of the key application areas except entertainment, but we're not really interested in that," he says. "We'll continue to support the existing products and maintain our presence on Q-Link."

Llevano adds that, because of the success of GEORAM, another hardware product is now on the drawing board for possible release in the fall.

With the market changing from week to week, Llevano stresses that it's very important for GEOS-product purchasers to send in their registration cards. "It's the only way we can keep them informed," he says.

For more information on companies and products mentioned in this article, please use the addresses listed below.

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Strategic Simulations
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Sunnyvale, CA 94086-2901

Virgin Mastertronic
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No Hard Disk

As computer entertainment moves into the 1990s, games have become more sophisticated and require much more memory and power than the 64 can deliver. Many of the new MS-DOS titles are distributed on three or more disks and need a hard drive to play effectively.

"The biggest headache is that games are becoming more and more advanced," Martin Alper says. "Because the 64 has no hard drive, larger games are tedious to play because of the multiple disks."

Based on the track record of companies now successful in the Commodore market, winning products are usually original arcade games, sports simulations, or productivity packages that utilize the 64's animation, graphics, sound, and playability.

"Sports games and particularly arcade games do very well," Alper says. "Adventures are more difficult to port over to the 64. The game design has to be radically changed."

Data East's Connie Freeman says that her company's genres, arcade and sports games, have kept it strong in the 64 market, but she adds that Data East does not plan to release any of its new role-playing games for the 64.

"We are being more discerning about what products we release on the 64," Freeman says. "We're not going to release the fantasy role-playing titles on the 64 because we're taking technology further and the 64 doesn't have that kind of power."

The booming popularity of MS-DOS gaming has caused many of the marketing departments of many 64-loyal software houses to try and convince executives to turn away from the 64.

"Our marketing people said *Omni-Play Horse Racing* was more appropriate for the IBM, because it is a more sophisticated market," Ringler says. "But we've had a tremendous response from 64 users. They appreciate the graphics and the detail. In fact, the 64 version is outselling the IBM one."

Who's Responsible?

A case can be made to blame Commodore for the demise of the 64, but Ed Ringler sees it differently.

"The software companies create the demise of hardware," Ringler says. "Just like the Atari 800. When people stopped making any products, it died."

To demonstrate its loyalty to the 64, Linda Blanchard reminds us that SSI was one of the last companies to support Atari 8-bit computers.

"We won't jump ship unless the market just doesn't exist anymore," she says.

Could the end finally be in sight for the 64, making it the next 8-bit computer to fall by the wayside?

"We're looking at maybe another two years," says Joe Hubbard, using a time frame now very familiar to 64 users. "The demand for 64 products will steadily decline, reaching a point where it's not feasible to develop any more products."

Hubbard optimistically adds, "But there is still demand for CP/M products, and CP/M went the way of the dinosaur long ago. The 64 may do the same. For home use, the 64 is still a good introductory computer. For some people it's still all they need." G

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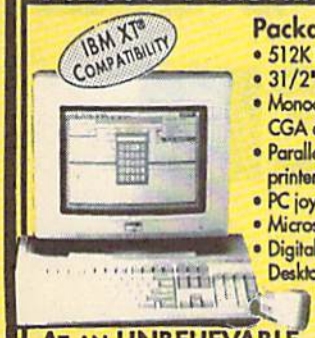

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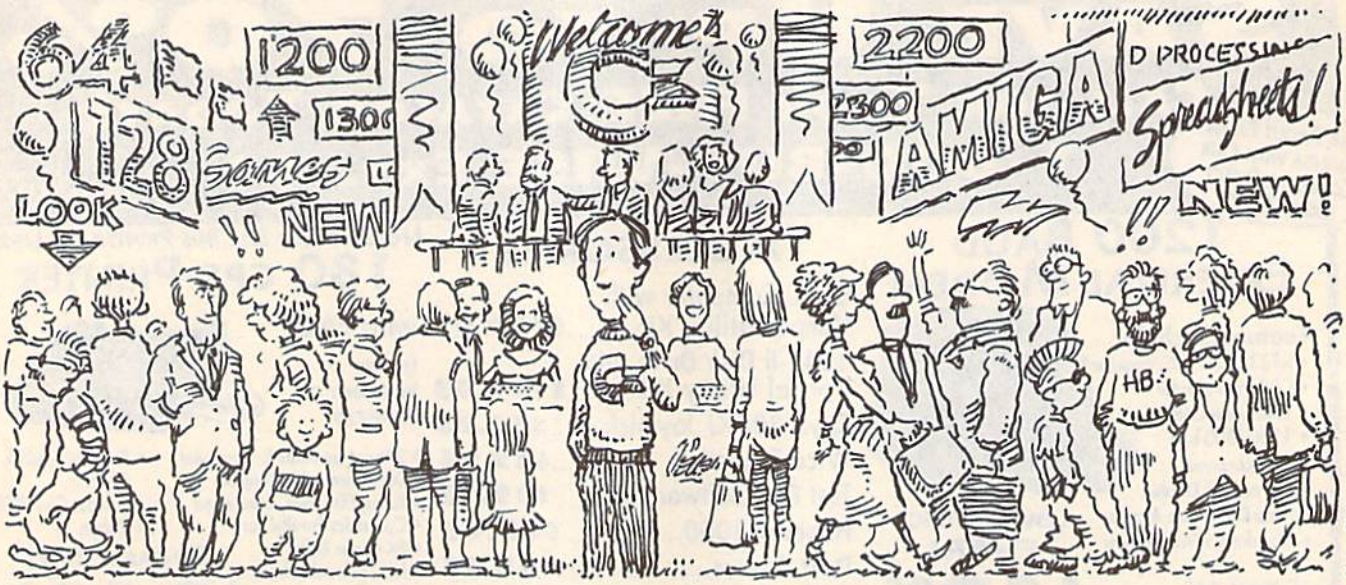

Harry Blair

COMMODORE COMPUTER SHOWS

How to Get the Most Out of Them

Robin Minnick

If a computer show makes you think of a convention of geeks and nerds, think again. There's a wealth of knowledge to be gained just by being there. Here's some excellent firsthand advice from an experienced showgoer.

I paused near the entrance, considering my next move. For the fourth year running, I was attending a local computer show with my husband. He was excited about one of the seminars. He's a hacker, so I figured the sessions he wanted to sit in on would be way over my head. The speakers I wanted to hear were either late or not coming at all. I noticed there were fewer vendors than in prior years, too. And while I don't claim to know everyone in town, I didn't recognize anybody at this show, either. Basically, this show just didn't look as good as some I had previously attended.

So what could this show do for me? Why didn't I just go back home? I stayed because even the most mediocre computer show has something to offer.

Of Like Dementia

While many of us like to communicate via bulletin boards or to swap programming hints at user group meetings, the truth is, computing is essentially a solitary endeavor. Even if everyone in the family has a use for the machine, those uses usually vary. Rarely do you find a soul mate in your own home who can understand (or stand) your ravings about a WYSIWYG word processor or the latest, souped-up version of an assembler. We need to be able to express our enthusiasms and communicate our crazes—and a computer show filled with participants of like dementia is the perfect forum.

Besides this fellowship, there is also the opportunity to learn more about your computer and how to use it. All these hackers can't get together without exchanging tips and methods, and with a sharp pair of ears, you will almost always learn something new.

Shows vary in content. Factors such as the show's size, its budget, who's sponsoring it, and how broad

Eight Show Tips

- Don't be afraid to go. Use the information in this article to familiarize yourself with show concepts. Be determined to make a fool of yourself, if you must. But most important, *go*.
- Don't be afraid to ask questions, especially of the experts. As wiser heads have pointed out, the pros assume we know all the computer basics, whereas many of us don't. If your question seems simple, ask it anyway. Chances are someone else is wondering the same thing. And, by all means, ask everyone: speakers, vendors, and hackers. Most of them love to show off their expertise.
- Talk to the vendors. Let them know what you like or dislike about their products and what you'd like to see in the future. Shows are sometimes the best way vendors have to find out exactly what you, as a consumer, want. This is also a good way to let the publishers know if you've had a problem with technical support, documentation, or just getting the right answer. When you discuss a problem with a vendor, give specifics such as names and dates, and you'll have a better chance of finding a solution.
- Play around with the computers on display. Whenever possible, test new programs and machines. You can't often do that in a store.
- Examine the list of scheduled speakers as soon as you arrive. Pick out whom you want to hear, find out where and when the talk is to be held, and plan to get a good seat. Take notes. Even better, take along a small tape recorder.
- Engage in conversation. Sometimes the best programming or applications tips come from other users or hackers. Or you may pass along something you've learned to someone who needs it. Carry cards with your name, address, phone number, and—if you're a member—the name of your user group. It's quicker than jotting down information while leaning on your new friend's back. Plus, having cards with you will encourage you to find people to pass them around to.
- Take someone else to the show with you, even if he or she is not as much of a computer freak as you. Your friend can sit in a seminar and hold a tape recorder or take notes so you don't have to miss a speaker scheduled for the same time in another room.
- Visit every booth, even if each doesn't have a flashy display to pull you in. One of the best buys I ever made was Xetec's *Fontmaster II*. I bought it at half-price, and all the booth housed was two systems, one person, and the program.

an audience it attracts affect the way a show is set up. Shows may be held at local hotels or convention centers, schools, or churches. There may or may not be an admission charge. The overall atmosphere may range from glitzy to scholarly; however, there are some elements common to most shows. In general, a computer show, or computer fair, will have three main components: speakers, vendors, and hackers.

Speakers discuss everything from programming techniques and MIDI to newsletter preparation and desktop publishing. Topics are usually covered in a series of seminars presented over the course of the show. Speakers may be drawn from local user groups, computer magazines, software companies, and even Commodore itself. Or they may be authors, programmers, or computer experts (gurus). It depends on the topics covered and the nature of the show.

Good Buys

Vendors maintain booths at the fairs to showcase their products. You'll often see a mix of local, regional, and national companies represented. They may tout new software, new hardware, gadgets and supplies, information on upcoming products, and even new applications for the computer. In addition to standard software and hardware offerings, I've seen booths with such diverse products as disks of Christian graphics for *The Print Shop*, plus colored ribbons and paper to print them; drive-alignment tools and other repair services; T-shirts bearing titles from popular software; and even disks of poetry composed by local poets (set in various fonts and screen colors). Many times, products are offered at "This Show Only" bargain prices. I've always found something worth buying.

Commodore is frequently asked to participate in these shows. If it does make an appearance, you have your golden opportunity to praise or criticize its machines and make suggestions as to what the company might do. You can offer feedback and suggestions to software vendors as well. Occasionally, you'll find yourself talking with individuals who actually wrote the software, especially if the company is a one- or two-person operation. In fact, the chance to talk to "the big guys" is the main reason some people attend computer shows.

Not to be overlooked are the booths maintained by area user groups, offering information on group meetings and local BBS numbers. And there are door prizes, too. You might win something to support your computer habit. I won some music software once. (And if I ever trade up to an Amiga, I'll be sure to put it to good use.)

If you haven't gone to a computer fair yet, you may feel you'll be overwhelmed by all the technology and computer talk, especially if you're a new computer user. Don't worry—any fears you might have are best conquered by jumping right in.

Right for the Home

There's no more complete or versatile machine for the money than the Commodore 64 or 128. It's the perfect first computer, especially for families or individuals without the dollars or inclination to compute at home big-time. These computers are easy to learn, and they can do everything: speech, graphics, word processing, math, and music. A 64 will always have a place in our home, even if bigger machines move in.

There will always be new computer families, too. It will take a long time for all of us to enter the Home Computer Age, regardless of what the companies would have us think. Computer shows can be a prime source of techniques and equipment for enthusiasts new to this addiction. It may seem like novice users would get the most from a computer show, but old-timers benefit, too. After all, people come up with novel uses for the 64 and 128 every day. So, check out the next show that comes your way. You'll certainly get your money's worth. **G**

1990 Commodore Shows Sponsored by The Hunter Group

Commodore/Amiga Users Fair	September 15–16	Valley Forge, PA
World of Commodore/Amiga	October 5–7	Rosemont, IL (near O'Hare Airport)
World of Commodore/Amiga	November 30–December 2	Toronto, Ont., Canada

For more show listings, check with your local Commodore User Group.

A Guide to Commodore User Groups

Part 2

Edited by Liz Casey

This annual *Gazette* feature provides an up-to-date list of user groups across the U.S., throughout Canada, and around the world. Part 1, published in last month's issue, includes states *A* through *M* (Alabama–Montana). Part 2 includes user groups from the remaining states (Nebraska–Wyoming), from APO sources, and from foreign countries. Under each state heading, groups are listed in order according to ZIP code. Groups from outside the U.S. are listed alphabetically under each country heading.

If your group does not appear in this list and you wish to be included, send your club name, address, and bulletin board service telephone number (if available) to

Commodore 64/128 User Group Update
COMPUTE!'s Gazette
P.O. Box 5406
Greensboro, NC 27403

Your group will be listed in "User Group Update" in a future issue.

Note: When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing. COMPUTE! Publications does not condone the use of its user group lists by individuals or user groups for the purpose of buying, selling, or trading pirated software. Should we discover any group participating in any such illegal and unethical activity, the club's listing will be permanently deleted from our files.

NEBRASKA

Pathfinder Commodore User Group, 1817 Briarcliff Rd., Fremont, NE 68025

Greater Omaha Commodore Users Group, P.O. Box 241155, Omaha, NE 68124 (BBS# 402-292-3628)

The Omaha Computer Society, P.O. Box 44129, Omaha, NE 68144-0129

Mid-Nebraska Users of Commodore (MUC), 1920 N. Huston Ave., Grand Island, NE 68803

KACCK: Kearney Area Commodore Computer Klub, P.O. Box 1611, Kearney, NE 68848-1611

McCook Commodore Users Group, 1010 E. 2nd St., McCook, NE 69001

Platte Valley Computer Users Group (PVCUG), P.O. Box 367, Gering, NE 69341

NEVADA

Clark County Commodore Computer Club (5 C's), 5099 Eldora, Las Vegas, NV 89102

NEW HAMPSHIRE

Manchester Commodore Users Group, P.O. Box 1641, Manchester, NH 03105

Commodore Help and Information Network (CHAIN Gang), P.O. Box 654, Laconia, NH 03247 (BBS# 603-286-7362)

NEW JERSEY

Info 64 Commodore User Group, c/o Jerry Fleischer, 186 Delmar Ave., Glen Rock, NJ 07452

Hillsdale Commodore 64 Users Club, 32 Esplanade Lake Dr., Hillsdale, NJ 07642

Garden State Commodore & MS-DOS User's Group, 89 Stratford Rd., Tinton Falls, NJ 07724 (BBS# 201-938-3885)

Commodore User Group of Central New Jersey, 112 Old Bridge Rd., Matawan, NJ 07747

Morris Area Commodore User Group (MACUG), P.O. Box 492, Mt. Tabor, NJ 07878

Data Exchange–Beneficial Users Group 64/128 (DE-BUG 64/128), 713 Second St., Dunellen, NJ 08812

Commodore E. Brunswick Users Group (CEBUG), 9 Kings Rd., E. Brunswick, NJ 08816

NEW MEXICO

New Mexico Commodore User Group, P.O. Box 37127, Albuquerque, NM 87176 (BBS# 505-268-4662)

Los Alamos Commodore Users Group, 4214-A Arizona St., Los Alamos, NM 87544 (BBS# 505-662-5940)

Taos Area Commodore User's Group, P.O. Box 5686, Taos, NM 87571

The Southern New Mexico Commodore User's Group, P.O. Box 4437, Uni. Park Brch., Las Cruces, NM 88003

Deming Commodore User Group (DCUG), 1400 Mallery Dr., Deming, NM 88030

Commodore Users Group of Roswell (CUGOR), 1619 N. Kansas, Roswell, NM 88201

NEW YORK

New York Commodore Interest Group (NYC=ig), 115 Essex St. Box #146, New York, NY 10002

Kids Computer News, St. Hilda's & St. Hugh's School, 619 W. 114th St., New York, NY 10025

New York Commodore Interest Group, c/o St. Hilda's & St. Hugh's School, 619 W. 114 St., New York, NY 10025

Bronx Users Group (BUG), P.O. Box 523, Bronx, NY 10475 (BBS# 212-671-7050)

Folklife Terminal Club, Box 555-R, Co-op City Station, Bronx, NY 10475

Elite Commodore User Group, c/o Aquil Lynch, 754 E. 23rd St., Apt. 3H, Brooklyn, NY 11210

Queens Commodore Users Group, 37 Skillman Ave., Brooklyn, NY 11211 (BBS# 718-366-7445)

Brooklyn Commodore User's Group, 1735 E. 13th St. Apt. 7N, Brooklyn, NY 11229-1952 (BBS# 718-645-1979)

Queens C-64 User Group, P.O. Box 129, Ozone Park, NY 11417

Commodore Users Group of Greater New York, 190-25 Woodhull Ave., Hollis, NY 11423

N.C.C.C., 151 DuBois Ave., Sea Cliff, NY 11579

Commodore Long Island Club, 15 Rochelle Ct., Amityville, NY 11701 (BBS# 516-489-4016)

Brentwood 64/128 Computer Club, Pub. Lib., 2nd Ave. & 4th St., Brentwood, NY 11717

C64-Five Users Group, P.O. Box 134, East Islip, NY 11730

Club 64, P.O. Box 2265, Patchogue, NY 11772

Mohawk Valley Computer User Group, c/o Wm. Nowak, 3818 Stinson Ave., Tribes Hill, NY 12177

Tri-City Commodore User's Group (TCCUG), P.O. Box 12742, Albany, NY 12212-2742

Hudson Valley Commodore Club, P.O. Box 2190, Kingston, NY 12401

Commodore User Group of Orange County, 30 Square Hill Rd. Box 41, New Windsor, NY 12550

Catskill Commodore Users Group, Box 160 RFD, Woodbourne, NY 12788

Frontier Computer Users, RFD #1 Box 352A, Chazy, NY 12921 (BBS# 518-846-8803 or 518-846-8934)

Oswego Commodore User Group, 402 Mahar Hall, State University College, Oswego, NY 13126

Central New York Commodore Users Group (CNYCUG), P.O. Box 397, Syracuse, NY 13209 (BBS# 315-433-0916)

The Commodore Computer Club of Syracuse, P.O. Box 2232, Syracuse, NY 13220 (BBS# 315-656-3544)

Utica Commodore User Group, 1801 Storrs Ave., Utica, NY 13501

Commodore Users Group of Massena (COMA), Brian Trzakos, c/o Jefferson School, Massena, NY 13662

The Niagara Falls Commodore/IBM Club, 2405 Willow Ave., Niagara Falls, NY 14305

Geneva Commodore Users' Group, 25 Pine St., Geneva, NY 14456

Commodore Users Group of Rochester (CUGOR), P.O. Box 23463, Rochester, NY 14692 (BBS# 716-621-5908)

Com-puter Club, P.O. Box 4339, Elmira, NY 14904

NORTH CAROLINA

Mayodan Commodore Users Group, 70 Virginia St., Mayodan, NC 27027

Sanlee Commodore Club, 514 Colonial Dr., Sanford, NC 27505

Baileys User Group (BUG), P.O. Box 70, Holly Springs, NC 27540

Western Carolina Commodore Beginner User Group (WCCBUG), Rt. 4 Box 387, Forest City, NC 28043 (BBS# 704-287-8052)

Salisbury Compute, Rt. 1 Box 349B, Salisbury, NC 28144

Wilmington Commodore Users Group, 2104 Wisteria Dr., Wilmington, NC 28401

Greater Onslow Commodore Users Group (GOCUG), P.O. Box 1644, Jacksonville, NC 28541

Asheville-Buncombe User Group (A-BUG), P.O. Box 15578, Asheville, NC 28813

NORTH DAKOTA

Central Dakota Commodore Club, P.O. Box 1584, Bismarck, ND 58502-1584

OHIO

The Commodore User Group (TCUG), P.O. Box 63, Brice, OH 43109 (BBS# 614-755-2604)

Central Ohio Commodore Users Group, P.O. Box 28229, Columbus, OH 43228-0229 (BBS# 614-274-6502)

Basic Bits Commodore Group, P.O. Box 447, N. Ridgeville, OH 44039

NorthEast Ohio Computer Users Group (NEOCUG), P.O. Box 196, Wickliffe, OH 44092

Commodore Preference Users Connection (CPU Connection), P.O. Box 42032, Brook Park, OH 44142 (BBS# 216-238-4578)

Portage County Commodore Family User Group (PCCFUG), P.O. Box 901, Ravenna, OH 44266 (BBS# 216-296-3692)

Trumbull Commodore Users Group (TRUMCUG), P.O. Box 8632, Warren, OH 44484

Mahoning Valley Commodore Club, P.O. Box 1180, Youngstown, OH 44501

Commodore Users Group, 29425 Bettler Rd. Box 175, Dennison, OH 44621

Canton/Akron/Massillon Users Group (CAMUG), P.O. Box 2423, North Canton, OH 44720 (BBS# 216-453-3319)

Commodore Erie Bay Users Group (CEBUG), P.O. Box 1461, Sandusky, OH 44870

Shelby Computer User Group, P.O. Box 512, Shelby, OH 44875

Western Cincinnati Commodore Club (WEST-COM 64), P.O. Box 89, Amelia, OH 45102

Southwestern Ohio Commodore Users Group (SWOCUG), P.O. Box 46644, Cincinnati, OH 45246

Dayton Area Commodore Users Group (DACUG), 1117 Lavern Ave., Kettering, OH 45429 (BBS# 513-878-1408)

Hancock User's Group (HUG), P.O. Box 1651, Findlay OH 45839-1651

OKLAHOMA

Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73502

Commodore Users of Bartlesville, 2524 SW Mountain Rd., Bartlesville, OK 74003 (BBS# 918-336-3872)

Tulsa Area Commodore Users Group (TACUG), P.O. Box 52473, Tulsa, OK 74169-1842 (BBS# 918-428-2284)

Muskogee Commodore Users Group (MCUG), 2429 Georgia, Muskogee, OK 74403 (BBS# 918-682-0773)

Osage/Kay Commodore User's Group (OKCOM), 317 Woodbury, Ponca City, OK 74601

OREGON

Commodore East County (CEC), 2424 SE Evans Ave., Troutdale, OR 97060-2328

Crash-64 Salem Area's Commodore User's Group, P.O. Box 241, Salem, OR 97308 (BBS# 503-585-3092)

Albany Corvallis Commodore Users Group (ACCUG), P.O. Box 1124, Corvallis, OR 97339

United States Commodore Users Group, P.O. Box 2310, Roseburg, OR 97470

CUA, P.O. Box 531, Medford, OR 97501 (BBS# 503-772-1092 6:00 p.m. to 8:00 a.m. PST)

PENNSYLVANIA

A-K 64 User Group, 1762 Fairmont St., New Kensington, PA 15068

Bettis Commodore Users Group, 592 Arbor Ln., Pittsburgh, PA 15236

Castle Commodore Computer Club, P.O. Box 961, New Castle, PA 16103

North Coast Commodore Users Group Erie, P.O. Box 6117, Erie, PA 16512-6117 (BBS# 814-899-1796)

Centre Area Commodore Computer Club, 441 Agricultural Administration Bldg., Penn State University, University Park, PA 16802

Capital Area Commodore Club, P.O. Box 333, Lemoyne, PA 17043

Huntingdon County Hackers, P.O. Box 132, Mill Creek, PA 17060

C.U.G.LEB.CO, P.O. Box 511, Richland, PA 17087

Harrisburg Area Computer Group, 721 S. 29th St., Harrisburg, PA 17111 (BBS# 717-558-9080)

White Rose Commodore Users Group, P.O. Box 7501, York, PA 17404-0501

Gods of Public Domain, 80 Faith Dr., Catasauqua, PA 18032

Lehigh Valley Commodore User Group, 4315 Crackersport Rd., Allentown, PA 18104

The Scranton Commodore Users Group (SCUG), P.O. Box 244, Scranton, PA 18501-0244 (BBS# 717-4969-1228 and 717-489-8001)

EPA Commodore Users Group, Edward H. Cohen, 1712 Aidenn Lair Rd., Dresher, PA 19025 (Note: Open to all federal government employees and their families)

Horsham Amiga/64, 20-A Lumber Jack Cir., Horsham, PA 19044

LCC, P.O. Box 48141, Philadelphia, PA 19144

Main Line Commodore Users Group (MLCUG), 1046 General Allen Ln., West Chester, PA 19382 (BBS# 215-354-9750)

Commodore User Groups, Part 2

Worldwide Commodore Users Group (International Headquarters), P.O. Box 337, Blue Bell, PA 19422

Buxmont Commodore and IBM Users Group, 1206 Cowpath Rd., Hatfield, PA 19440

RHODE ISLAND

Warwick Commodore Users Group, 110 River St., Riverside, RI 02915

Narragansett Commodore Users Group, P.O. Box 8707, Cranston, RI 02920

SOUTH CAROLINA

Commodore Computer Club of Columbia, c/o HGC/ST, 710 Vintage Ln., Columbia, SC 29210

BIBS, 658-C Windermere, Charleston, SC 29407 (BBS# 803-556-9094)

Greenville Commodore Users Network (GCUN), P.O. Box 5272, Station B, Greenville, SC 29606

TENNESSEE

Clarksville Commodore Users Group, P.O. Box 2171, Clarksville, TN 37042-2171

Commodore Association of the Southeast (CASE), P.O. Box 2745, Clarksville, TN 37042-2745

Multi-User Computer Club, 213 Holly Ave., South Pittsburg, TN 37380-1313 (BBS# 615-837-8352)

Chattanooga Commodore Users, 1406 Blackwell Dr., Chattanooga, TN 37412

Raleigh-Bartlett Hackers CUG, James Patrick, 3457 Gatewood Dr., Memphis, TN 38134

Memphis Commodore Users Club, P.O. Box 34095, Memphis, TN 38134-0095 (BBS# 901-362-0632)

TEXAS

Society of Computer Owners and PET Enthusiasts (SCOPE), P.O. Box 833095, Richardson, TX 75083

Texas Commodore User's Group, P.O. Box 623, Royse City, TX 75089

Mid-Cities Commodore Club, P.O. Box 813, Bedford, TX 76095 (BBS# 817-268-4191)

The Wichita County Commodore User's Co-op, 240 Kitchings St., Wichita Falls, TX 76301 (BBS# 817-855-7557 or 817-696-2520)

Central Texas Computer Users Group, 902 Carlisle, Killeen, TX 76541-7321

The Willis Commodore Users Group, 8 Forest Trails, Willis, TX 77378

Tri-County Commodore Users Association (T-CCUA), 557 Lakeview Cir., New Braunfels, TX 78130

Amistad Commodore Users Group, P.O. Box 421212, Del Rio, TX 78842

Top of Texas Commodore (TOTCOM), Box 2851, Pampa, TX 79066-2851

Tri-State Commodore Users Group (Tri-CUG), P.O. Box 8971, Amarillo, TX 79114-8971 (BBS# 806-355-3031)

Commodore Users of Texas (CUT), 7007 Memphis Ave., Lubbock, TX 79413 (BBS# 806-792-7121)

The Software Palace, 11200 Socarro Rd., El Paso, TX 79927 (BBS# 915-859-8714)

El Paso Commodore User Group, P.O. Box 370934, El Paso, TX 79937 (BBS# 915-833-1024)

UTAH

Mountain Computer Society, 3898 Cheryl St., West Valley, UT 84119

Moab Commodore User's Group, 860 S. Antiquity Ln., Moab, UT 84532

Payson Area Commodore Users Group (PAC), P.O. Box 525, Salem, UT 84653 (BBS# 801-423-2734)

VERMONT

Maple Valley Commodore Users Group, P.O. Box 106, St. Albans, VT 05478 (BBS# 802-524-9387)

Green Mountain Commodore Users Group (GMCUG), P.O. Box 6087, Rutland, VT 05702

VIRGINIA

Washington Area Commodore User Group (WAC), P.O. Box 3602, Fairfax, VA 22038-3602

Capitol Area Commodore Enthusiasts (CACE), 607 Abbotts Ln., Falls Church, VA 22046

Dale City Commodore Users Group, P.O. Box 2265, Dale City, VA 22193-0265

Fredericksburg Commodore Club, P.O. Box 8438, Fredericksburg, VA 22404-8438

Middle Peninsula Commodore Users Group (MPCUG), P.O. Box 391, Gloucester, VA 23061 (BBS# 804-642-0871)

South Richmond Commodore User Group, P.O. Box 1393, Midlothian, VA 23113

CURVE, P.O. Box 28284, Richmond, VA 23228 (BBS# 804-288-1439)

The Richmond Area Commodore Enthusiasts (TRACE), 2920 Pinehurst Rd., Richmond, VA 23228

Tidewater Commodore Users Group, P.O. Box 61814, Virginia Beach, VA 23462 (BBS# 804-499-1319)

Portsmouth Commodore Users Group (PCUG), P.O. Box 6561, Portsmouth, VA 23703 (BBS# 804-488-8372)

Henry County Commodore Computer Club, Rt. 9 Box 61, Martinsville, VA 24112

Lynchburg User Group, Rt. 2 Box 180, Lynchburg, VA 24501

Commodore Users of Lynchburg (CUOL), P.O. Box 3386, Rivermont Station, Lynchburg, VA 24503

WASHINGTON

Renton Computer Group, 11308 SE 269th St., Kent, WA 98031

E/T, P.O. Box 1767, Bothell, WA 98041-1767

South King County Commodore User Group (SKCCUG), P.O. Box 5241, Kent, WA 98064 (BBS# 206-874-6289)

NW Commodore User Group, 2565 Dexter N #203, Seattle, WA 98109 (BBS# 206-281-7661)

PSACE, 1313 5th Ave. W, Seattle, WA 98119-3410

UW Commodore User Group, P.O. Box 25878, Seattle, WA 98125 (BBS# 206-281-7661)

Club 64, 6735 Tracyton Blvd. NW, Bremerton, WA 98310

La Center Commodore Users Group, Rt. 1 Box 42, La Center, WA 98629

Tri-City Commodore Computer Club (TC CUBED), P.O. Box 224, Richland, WA 99352-0224 (BBS# 509-588-6822)

Blue Mountain Commodore Users, 550 S. 2nd Ave., Walla Walla, WA 99362-3149 (BBS# 509-529-5226)

WEST VIRGINIA

Bluefield User Group 20/64 (BUG), P.O. Box 1190, Bluefield, WV 24701

Commodore Home User's Group (CHUG), 81 Lynwood Ave., Wheeling, WV 26003

Mid-Ohio Valley Commodore Club (MOVCC), P.O. Box 2222, Parkersburg, WV 26101-2222 (BBS# 304-295-6502)

WISCONSIN

Lakeshore Commodore Core, 519 Westwood Dr., Sheboygan Falls, WI 53085

Commodore Hobbyists Involved in Personal Systems (CHIPS), P.O. Box 1006, West Bend, WI 53095

Wisconsin Association of Vic/C= Enthusiasts (WAVE), 1020 Kurtis Dr., Elm Grove, WI 53122

Milwaukee Area Commodore Enthusiasts (MACE), P.O. Box 26216, Milwaukee, WI 53226

COMM-BAY64, P.O. Box 1152, Green Bay, WI 54305 (BBS# 414-494-1527)

Price County Computer User Group, 630 Knox St., Prentice, WI 54556

Western Wisconsin La Crosse Area Commodore Users Group, 622 Avon St., La Crosse, WI 54603 (BSS# 608-784-8016)

Excalibar 64/Amiga, Rt. 3 Box 30-AA, Cumberland, WI 54829

WYOMING

Casper Commodore Users Group (CCUG), c/o Crazy Mountain Software, 511 E. 2nd St., Casper, WY 82601 (BBS# 307-577-7400)

U.S. ARMED SERVICES ABROAD

The Muenster Garrison User's Group, c/o Mr. Maki, 583rd Ord Co., APO, NY 09078

Commodore Computer Users Group Heidelberg, P.O. Box 232 (147th Postal), APO, NY 09102

Chicksands Computer Club (C cubed), c/o Erik Pedersen, Box 148 6950th ESG, APO, New York, NY 09193

Alconbury Commodore Computer User's Group, Attention: SMSgt Willie J. Johnson, Box 58, APO, NY 09238-5000

U.S. Naval Station Guantanamo Bay Cuba Computer Users Group, P.O. Box 160, FBPO Norfolk, VA 23593

USER GROUPS OUTSIDE THE U.S.

AUSTRALIA

Commodore Computer Users Group (QLD), P.O. Box 274, Springwood Qld., 4127, Brisbane, Australia

Commodore Hints and Tips Swapping (CHATS), P.O. Box 212, Essendon, 3040, Victoria, Australia

Commodore 64 Users Group, 14 Richards Rd., High Wycombe 6057, Perth, Western Australia, Australia

C64 Computer User, P.O. Box 826, Young, New South Wales 2594, Australia

Melbourne Commodore Computer Club, P.O. Box 177, Box Hill, Victoria 3128, Australia

BELGIUM

L'Amiral Club Amiga, P.O. Box 41, B-1090, Brussels, Belgium

BRAZIL

Curitiba Commodore Club, R. Ver. Garcia R. Velho 33, Apto. 41- Bairro Cabral, 80030 Curitiba-PR, Brasil

Tcs Computer Club, Rua Job Ln. 650, 04639 Santo Amaro, São Paulo, Brasil

CANADA

Alberta

Calgary Commodore Users Group, 37-11810 Macleod Tr. SE, Calgary, Alb., Canada T2J 2V8

Commodore Users of Edmonton (CUE), Box 3155, Fort Saskatchewan, Alb., Canada T86 2T2

BRiWALL BRiWALL

P.O. Box 129/58 Noble Street
Kutztown, PA 19530

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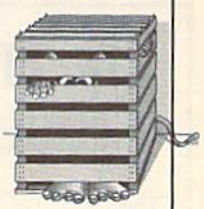

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Circle Reader Service Number 119

Mudfrog Math

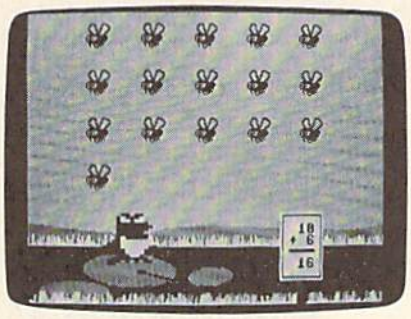
Pull up a lily pad. Professor Mudfrog is about to give another lesson in simple addition and subtraction on the 128.

Cullen O'Day

Is it study time or lunchtime? For the mathematical genius of the croaking set, it's both!

Bzzz. Zip-CHOMP! If you listen carefully on a hot summer day, you'll hear Professor Mudfrog teaching his math lessons down at the old pond. And when your children sit in with this bright little amphibian, they'll have so much fun they won't even realize how much they're learning.

Mudfrog Math is an entertaining way to present simple addition and subtraction problems to preschool children. Youngsters simply count the number of flies on the screen and type in their answer. Mudfrog then croaks his approval or disapproval.



With his endearing charm, Professor Mudfrog makes addition and subtraction child's play.

Getting Started

Mudfrog Math is written in BASIC 7.0. To prevent typing errors, enter the program using *The Automatic Proofreader*, found elsewhere in this issue. Once you've finished typing it in, be sure to save a copy of the program to disk.

When you're ready to play *Mudfrog Math*, load the program and type RUN. After a brief delay, a screen listing five options will appear. Choose Option 1 to alternate between addition and subtraction problems, Option 2 for addition problems only, Option 3 for subtraction problems only, or Option 4 for a random selection of both types of problems. To exit the program, select Option 5.

When you choose Options 1–4, you're placed in Mudfrog's floating classroom. You'll find the professor sitting on his favorite lily pad, anxiously awaiting the arrival of some tasty math problems. To the right is a magic chalkboard where Mudfrog displays the equations he wants you to solve.

Lunchtime

Each problem begins with a number flashing on the board. At the same time, an equivalent number of flies buzz into view. Next, depending on the option chosen, either a plus or a minus sign appears on the board. The number that is to be added or subtracted from the first number then appears.

If it's an addition problem, the number of flies to be added buzz out to join the others. If it's a subtraction problem, Mudfrog opens wide and reels in the number of the insects to be subtracted. When the question mark flashes, count the number of flies in the sky and then use the numeric keypad to enter that number.

Mudfrog patiently waits until your children are ready to solve each problem. If they type in an incorrect answer, he croaks quizzically and lets them try again. When they answer the equation correctly, Mudfrog cheerfully croaks three times. The remaining flies then make a hasty exit, and it's on to the next problem.

After solving ten math problems, the program returns you to the options screen. Another series of problems can be selected or the session can be closed by choosing Option 5.

Zip-CHOMP! Zip-CHOMP! Mudfrog sure is having fun teaching math at the pond. Your children may never develop a taste for his cuisine, but his love of mathematics can't help but get them hopping for more.

Mudfrog Math

```
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HB 20 COLOR0,4:GRAPHIC1,1:COLO
      R0,1:GRAPHIC0,1:SPRCOLOR
      2,1
HG 30 DIMFR$(6),FL$(2),FP(20,1
      ),CK(10)
JR 40 X=RND(-TI/101):DEFFNR(X)
      =INT(RND(1)*X+1)
RQ 50 SX=24:SY=50:F=0:FF=0:FOR
      I=1TO10:CK(I)=-1:NEXT
MP 60 ND=10:REM NUMBER OF PROB
      LEMS
QQ 70 FAST:GOSUB1370:GOSUB1620
      :GOSUB1170:SLOW
HH 80 DO:PR=0:SPRITE1,0:COLOR0
      ,1:GRAPHIC0
SR 90 MOVSPR1,79,109:SPRITE1,1
HJ 100 GOSUB1130
MC 110 IFCH=5THENEXIT
ME 120 SPRITE1,0:COLOR0,4:GRAP
      HIC1
DB 130 MOVSPR1,88,181:SPRITE1,
      1
JM 140 DO:PR=PR+1:GOSUB540
QS 150 ONCHGOSUB750,710,730,77
      0
CR 160 X=29:Y=19:GOSUB660:GOSU
```

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      B590
HS 170 ONSNGOSUB280,390
BB 180 GOSUB790:GOSUB1020
HP 190 LOOPUNTILPR=ND
KH 200 SLEEP2
DP 210 LOOP
BB 220 FORI=1TO3:SPRSAVFR$(I),
       1:FORJ=1TO12:NEXTJ,I:SO
       UND1,1500,20,2,500,40,2
       ,3600
XJ 230 FORI=3TO1STEP-1:SPRSAVF
       R$(I),1:FORJ=1TO15:NEXT
       J,I
ES 240 SLEEP2:SCNCLR:GOSUB260:
       COLOR5,4
SF 250 END
HM 260 FORI=1TO8:SPRITEI,0:MOV
       SPRI,0#0:NEXT
GH 270 RETURN
HR 280 DOWHILEFP<TN:FP=FP+1:Y=
       FP(FP,1)+SY:MOVSPR2,345
       ,Y
BD 290 SPRITE2,1,1,0,0,0,0:SPR
       SAVFL$(1),2:MOVSPR2,270
       #11:SOUND2,2250,180,2,1
       700,277,1
SM 300 DO:SPRSAVFL$(1),2
MR 310 IFRSPPOS(2,0)<FP(FP,0)+
       SX+18THENEXIT
QE 320 SPRSAVFL$(2),2
CS 330 IFRSPPOS(2,0)<FP(FP,0)+
       SX+18THENEXIT
RE 340 LOOP
DR 350 SOUND2,0,0:MOVSPR2,0#0:
       MOVSPR2,FP(FP,0)+SX,FP(
       FP,1)+SY:SPRSAVFL$(1),2
QA 360 COLOR1,1:GSHAPEFL$(0),F
       P(FP,0),FP(FP,1):SPRITE
       2,0
BG 370 LOOP
HS 380 RETURN
ED 390 DOWHILEFP>TN
QM 400 MOVSPR2,FP(FP,0)+SX,FP(
       FP,1)+SY:SPRITE2,1:GSHA
       PEFL$(0),FP(FP,0),FP(FP
       ,1),4
BB 410 FORI=2TO6:SPRSAVFR$(I),
       1
PB 420 FORJ=1TO10:NEXTJ,I
CJ 430 COLOR1,11:WIDTH2:SOUND1
       ,2300,20,0,1300,52,2,40
       60:DRAW1,88,150TOFP(FP,
       0)+12,FP(FP,1)+15
EK 440 SOUND2,65000,42,0,56000
       ,2200,1
DH 450 FORI=1TO5:SPRSAVFL$(2),
       2:FORJ=1TO20:NEXT
XX 460 SPRSAVFL$(1),2:FORJ=1TO
       20:NEXTJ,I
RR 470 SOUND1,2300,20,1,1300,5
       2,2,4060
XP 480 SPRITE2,0:DRAW0,FP(FP,0
       )+12,FP(FP,1)+15TO88,15
       0:DRAW0,88,150TOFP(FP,0
       )+12,FP(FP,1)+15:WIDTH1
AB 490 FORI=5TO1STEP-1:SPRSAVF
       R$(I),1
SD 500 FORJ=1TO6:NEXTJ,I
PC 510 FP=FP-1
XX 520 LOOP
JH 530 RETURN
SQ 540 FP=0:N1=FNR(10):N$=STR$
       (N1):N$=MID$(N$,2,2):M$
       =" ":X=31:Y=18:TN=N1
FE 550 IFN1>9THENX=30:M$="
       {2 SPACES}"
RH 560 GOSUB660
GM 570 IFN1<>0THENGOSUB280
QP 580 RETURN
JH 590 IFSN=1THENN2=FNR(11)-1:
       TN=N1+N2
PD 600 IFSN=2THENN2=FNR(N1+1)-
       1:TN=N1-N2
CP 610 IFCK(N1)=N2THEN590:ELSE
       CK(N1)=N2
GX 620 N$=STR$(N2):N$=MID$(N$,
       2,2):M$=" ":X=31:Y=19
BB 630 IFN2>9THENX=30:M$="
       {2 SPACES}"
SM 640 GOSUB660
PX 650 RETURN
FM 660 COLOR1,8
QE 670 FORI=1TO5:SOUND2,40500,
       5,,,,2,4070:CHAR1,X,Y,N
       $,1:FORJ=1TO40:NEXT
PD 680 CHAR1,X,Y,M$,1:FORJ=1TO
       40:NEXT
BK 690 NEXT:CHAR1,X,Y,N$,1
RA 700 RETURN
DD 710 SN=1:N$="+":M$="+"
FC 720 RETURN
AE 730 SN=2:N$="-":M$="D"
RF 740 RETURN
QS 750 F=NOT(F):ONF+2GOSUB710,
       730
FH 760 RETURN
MX 770 ONFNR(2)GOSUB710,730
RG 780 RETURN
HE 790 POKE208,0
EE 800 DO:AN=0:COLOR1,8:CHAR1,
       30,21,"{2 SPACES}",1
KQ 810 IFTN<10THENX=31:ELSEX=3
       0
GR 820 DO:DO:DO
RB 830 CHAR1,X,21,"?",1
AR 840 GETK$:IFK$<>""THENEXIT
QH 850 GOSUB1000
XE 860 CHAR1,X,21," ",1
EK 870 GOSUB1000
GG 880 LOOP
BA 890 LOOPUNTILK$>="0"ANDK$<=
       "9"
MM 900 CHAR1,X,21,K$,1
FK 910 IFX=30THENAN=VAL(K$)*10
       :ELSEAN=AN+VAL(K$)
QC 920 X=X+1:POKE208,0
JQ 930 LOOPUNTILX>31
AF 940 IFTN=ANTHENN=3:FQ=1500:
       X=20:ELSEN=1:FQ=1200:X=
       30
JR 950 FORK=1TON:FORI=1TO5:SPR
       SAVFR$(I),1:FORJ=1TO12:
       NEXTJ,I:SOUND1,FQ,X,2,5
       00,40,2,3600
AP 960 IFX=30THENFORI=1TO40:NE
       XT
FF 970 FORI=4TO1STEP-1:SPRSAVF
       R$(I),1:FORJ=1TO15:NEXT
       J,I,K
QP 980 LOOPUNTILTN=AN
CE 990 RETURN
GA 1000 IFFNR(20)=20THENFF=NOT
        (FF):SPRSAVFR$(FF+2),1
DS 1010 RETURN
RK 1020 DOWHILEFP>0
SB 1030 MOVSPR2,FP(FP,0)+SX,FP
        (FP,1)+SY:SPRITE2,1
MC 1040 GSHAPEFL$(0),FP(FP,0),
        FP(FP,1),4:MOVSPR2,270
        #15
MB 1050 SOUND2,60000,12,0,1700
        ,700,1
HP 1060 DO:LOOPUNTILRSPPOS(2,0
        )<20
PG 1070 SPRITE2,0:MOVSPR2,0#0:
        FP=FP-1
SD 1080 LOOP
QK 1090 IFTN=0THENSLEEP1
AS 1100 COLOR1,8:CHAR1,29,18,"
        {3 SPACES}",1:CHAR1,29
        ,19,"{3 SPACES}",1:CHA
        R1,29,21,"{3 SPACES}",
        1
PF 1110 CHAR0,14,17," ":CHAR0,
        12,16,"{6 SPACES}"
HH 1120 RETURN
RD 1130 DO:CHAR,19,14,"{7}CHOO
        SE:":GETCH$:GOSUB1000:
        CHAR,19,14,"{YEL}CHOOS
        E:"
DA 1140 LOOPUNTILCH$>"0"ANDCH$
        <"6"
BX 1150 CH=VAL(CH$)
DJ 1160 RETURN
GR 1170 COLOR4,13:COLOR0,4:GRA
        PHIC1
JB 1180 COLOR1,7:BOX1,0,160,31
        9,199,,1:FORI=1TO99:DR
        AW0,FNR(320)-1,FNR(38)
        +152:NEXT
EE 1190 DRAW1,88,176:DRAW1,160
        ,180
XP 1200 COLOR0,6:BOX0,0,152,31
        9,159,,1
MP 1210 COLOR1,14:FORX=0TO319:
        G=FNR(8)-1:DRAW1,X,152
        +GTOX,159:NEXT
EB 1220 COLOR1,6:DRAW1,0,144TO
        35,148TO80,151TO0,151:
        PAINT1,0,145
PR 1230 DRAW1,319,151TO103,151
        TO120,147TO155,145TO22
        0,147TO290,149TO319,14
        6:PAINT1,319,147
JD 1240 COLOR4,12
RF 1250 COLOR0,7:BOX0,0,192,31
        9,199,,1
MX 1260 COLOR0,1:BOX0,224,136,
        263,183,,1
FS 1270 COLOR1,8:BOX1,224,136,
        263,183,,1:BOX0,226,13
        8,261,181:CHAR1,29,20,
        "DDD",1
GE 1280 COLOR0,6:CIRCLE0,88,17
        6,40,11,,,1:PAINT0,88,
        176
BD 1290 COLOR1,7:WIDTH2:CIRCLE
        1,98,177,3,1:DRAW1,97,
        177TO121,182TO125,182T
        O97,177:WIDTH1
HB 1300 CIRCLE0,160,180,20,6,,
        ,358:PAINT0,160,180
AM 1310 CIRCLE0,39,191,30,7:PA
        INT0,40,191
RJ 1320 COLOR1,14:FORX=0TO319:
        G=FNR(8)-1:DRAW1,X,192
        +GTOX,199:NEXT
RR 1330 COLOR0,9:BOX0,240,184,
        247,199,,1
CP 1340 COLOR1,10:WIDTH2:DRAW1
        ,240,184TO246,184TO246
        ,199:WIDTH1
HE 1350 COLOR0,4:GSHAPEFL$(1),
        0,0:SSHAPEFL$(0),0,0,2
        3,16:GSHAPEFL$(0),0,0,
        4
GH 1360 RETURN
BP 1370 COLOR4,16:GRAPHIC0
RM 1380 CHAR,0,0,"{4}
        {4 SPACES}C{2 SPACES}U
        {2 SPACES}L{2 SPACES}L
        {2 SPACES}E{2 SPACES}N
        {5 SPACES}O ' D
        {2 SPACES}A{2 SPACES}Y
        {4 SPACES}",1
AR 1390 CHAR,17,2,"{CYN}{A}***
        **********{S}"
PB 1400 FORI=3TO9:CHAR,17,I,"
        {17 SPACES}":NEXT
XK 1410 CHAR,17,10,"{F}
        {17 SPACES}{D}",1
BR 1420 CHAR,20,4,"{WHT}M U D
        {SPACE}F R O G"
RC 1430 CHAR,23,6,"M A T H"
MR 1440 CHAR,19,8,"{YEL}ADD &
        {SPACE}SUBTRACT!"
XE 1450 CHAR,19,9,"{WHT}{@}{4}
        {2 I}{2 SPACES}{WHT}
        {@} {YEL}{@} {4}{2 I}
```

```
        {3 SPACES}{WHT}{@}"
AJ 1460 CHAR,7,8,"{YEL}{3 @}"
BM 1470 CHAR,6,9,"{L}{BLU}
        {2 Y}{RVS}DD{OFF}{2 Y}
        "
SP 1480 CHAR,5,11,"{8}£
        {8 SPACES}{*}",1
SC 1490 CHAR,4,12,"£
        {10 SPACES}{*}",1
DD 1500 CHAR,4,13,"{5}U*******
        ***I",1
GM 1510 CHAR,4,14,"{RVS}JK{4}
        {OFF}£{RVS}UIUIUI
        {OFF}{*}{RVS}{5}JK"
HR 1520 FORI=15TO22:CHAR,7,I,"
        {4}-{5}-{8}--{5}-{4}-"
        ,1:NEXT
GM 1530 CHAR,0,23,"{RVS}{4}
        {3 SPACES}COPYRIGHT 19
        90 COMPUTE! PUB., INC.
        {3 SPACES}"
CD 1540 CHAR,0,24,"{10 SPACES}
        ALL RIGHTS RESERVED
        {10 SPACES}"
BG 1550 CHAR,0,24,CHR$(148):CH
        AR,0,24," "
EM 1560 CHAR,20,15,"{OFF}{CYN}
        1.{BLU} ADD & SUBTRACT
        "
MS 1570 CHAR,20,16,"{CYN}2.
        {BLU} ADD ONLY"
SR 1580 CHAR,20,17,"{CYN}3.
        {BLU} SUBTRACT ONLY"
EJ 1590 CHAR,20,18,"{CYN}4.
        {BLU} RANDOM ORDER"
JJ 1600 CHAR,20,19,"{CYN}5.
        {BLU} END LESSON"
CE 1610 RETURN
AF 1620 GOSUB260
HG 1630 FORI=3584TO4095:READJ:
        POKEI,J:NEXT
ES 1640 FORI=1TO6:SPRSAVI,FR$(
        I):NEXT
KA 1650 FORI=7TO8:SPRSAVI,FL$(
        I-6):NEXT
ED 1660 SPRSAVFR$(1),1:SPRITE1
        ,0,10,0,1,1,1
BH 1670 C=0:FORI=8TO104STEP32:
        FORJ=48TO240STEP48
QH 1680 C=C+1:FP(C,0)=J:FP(C,1
        )=I:NEXTJ,I
MM 1690 RETURN
PJ 1700 DATA ,,,,,,,,,,,,,,,,
        ,,,,,,,,,,,,,162
XR 1710 DATA 128,2,123,64,162,
        170,162,170,85,86,170,
        85,90,42,149,104,10,14
        9,96,2,165,128,10,170,
        160,42,34,40,40,,,0
EH 1720 DATA ,,,,,,,,,,,,,,,,
        ,,,,,,,,,,162,128,2,1
        23
GG 1730 DATA 64,2,89,64,162,17
        0,162,170,85,86,170,85
        ,90,42,149,104,10,149,
        96,2,165,128,10,170,16
        0,42,34,40,40,,,0
GG 1740 DATA ,,,,,,,,,,,,,,,,
        ,,162,128,2,123,64,2,8
        9,64,2,170,168,2,191
BJ 1750 DATA 240,2,255,192,2,8
        5,84,42,85,86,170,85,9
        0,170,149,106,42,149,1
        04,2,165,128,10,170,16
        0,42,34,40,40,,,0
KQ 1760 DATA ,,,,,,,,,162,128
        ,2,123,64,2,89,64,2,17
        0,160,2,170,168,2,191,
        240,2,255,192,2,255
PM 1770 DATA 240,2,127,244,10,
        85,84,42,85,84,170,85,
        90,170,149,106,42,149,
        104,2,165,128,10,170,1
        60,42,34,40,40,,,0
JE 1780 DATA ,162,128,2,123,64
        ,2,89,64,2,170,160,2,1
        70,168,2,191,240,2,255
        ,192,2,255,192,2,255,2
        40,2,127,244,10,95
SX 1790 DATA 244,42,85,84,170,
        85,86,170,85,90,42,149
        ,104,10,149,96,2,165,1
        28,10,170,160,10,34,40
        ,40,34,8,32,,,0
AD 1800 DATA 2,,,2,,,182,,,150
        ,,,42,,,182,,,150,,,15
        0,,,42,,,10,195,212,2,
        253
HQ 1810 DATA 84,42,213,84,170,
        85,86,170,85,90,42,85,
        88,10,149,96,2,149,128
        ,10,170,160,10,34,40,4
        0,34,8,32,,,0
FC 1820 DATA 3,192,240,6,97,15
        6,12,33,6,8,35,2,12,50
        ,6,6,22,12,3,20,56,7,2
        20,96,31,253,240,34,15
        ,248,42,143
CE 1830 DATA 248,38,31,240,31,
        255,224,6,254,128,4,85
        ,64,2,69,,,40,,,,,,,,
        ,,,,,0
SS 1840 DATA ,,,,,,,,,,,,31,,3
        1,113,192,113,192,97,1
        93,56,51,3,7,220,6,31,
        254,28,34,15
HE 1850 DATA 248,42,143,248,38
        ,31,240,31,255,224,6,2
        54,128,4,85,64,2,69,,,
        40,,,,,,,,,,0
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SPHEROIDS

Kevin Dixon

Challenge a friend in this spectacular, action-packed shoot-'em-up for the 64. Two joysticks required.

EDITOR'S CHOICE

In the year 2100, nuclear weapons are relics of a forgotten era. In this day and age, countries settle their differences in a duel between representative gladiators. The site of their engagement is the Arena, a manmade battlefield consisting of treacherous pits and hills.

At the start of each duel, six lethal spheroid bombs are randomly scattered about the Arena. Each contestant moves about in a hovercraft, collecting the bombs and then firing them at the opposing gladiator. Because of their spherical shape, the bombs roll across the Arena at high speeds. But at the same time, the undulating surface of the playfield makes their movement unpredictable. As you'll soon learn, the keys to survival in *Spheroids* are quick reflexes and a deadly aim.

Getting Started

Spheroids consists of three programs. The first two are written in BASIC. To avoid typing errors, enter these using *The Automatic Proofreader*, located elsewhere in this issue. When you've finished typing, save these programs to disk as SPHEROIDS.BOOT and SPHEROIDS .BASIC, respectively.

The third program is written in machine language, so you'll need *MLX*, the machine language entry program located elsewhere in this issue, to type it in. The *MLX* prompts, and the values you should enter, are as follows:

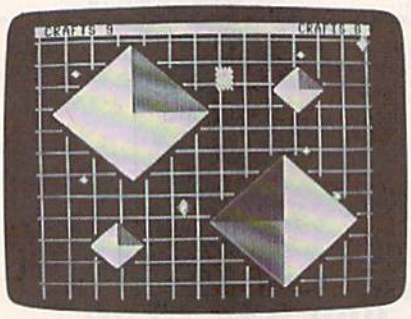
Starting address: $0801
Ending address: $1788

When you've finished typing, save this program to disk as SPHEROIDS.ML.

To play a game, plug in two joysticks; then load and run SPHEROIDS .BOOT. After a short delay, a title screen will appear, showing the various objects you'll encounter in the game. Press any key or a fire button to continue.

Prepare for Battle

Before each battle, you're presented with a menu for selecting and generating different battlefields. Press f3 and f4 to cycle through the selections; then press f1 to generate the chosen battlefield on the screen. Battlefield selection can also be made using a joystick. Push either stick left or right to cycle through the battlefields; then push up or down to generate your choice.



There are six battlefields to choose from: Open, Lattice, Diamond, Cyclone, Quadrate, and Random. Each battlefield, with the exception of Open, contains mounds and depressions. These appear as diamond-shaped objects on the screen and come in four different sizes. Mounds are blue in color, while depressions are gray.

Every battlefield contains a teleport device that appears on the screen as a flashing yellow checkerboard. When a hovercraft or a spheroid enters the teleporter, it's transferred randomly to another location on the playfield. In the process, the teleported object retains its original velocity and direction.

After you've selected a battlefield, press f7 or a joystick button to begin a match. Initially, each player is given nine hovercraft with which to do battle. The green ship, controlled by joystick 1, appears at the upper right corner of the screen; the blue ship, controlled by joystick 2, is at the lower left. The number of craft remaining for each player is shown at the top of the screen. A game ends when you've destroyed your opponent's entire hovercraft fleet.

Playing the Game

Players use bombs, or *spheroids*, to try to eliminate the opponent. Six spheroids are scattered randomly across the battlefield. These small devices are collected and fired from the hovercraft. When launched, they roll across the battlefield at high speeds. To pick up a spheroid, simply guide your hovercraft over one. When you're ready to fire, push the joystick in the direction you wish to shoot and press the fire button.

Once fired, the spheroid assumes the color of the firing ship. If the opposing player's ship comes into contact with a spheroid armed by your craft, it is instantly destroyed. Armed spheroids have enough momentum to propel themselves about two lengths of the Arena. When its energy has dissipated, the spheroid slows and its color reverts to red. It can now be picked up and rearmed by either player.

Since the spheroid bombs roll along the surface, the mounds and depressions affect the way they travel across the playfield. For example, if a spheroid is fired into a depression, it will roll around the sides until it eventually settles in the center.

When the game is over, press any key or a fire button to return to the main

menu. To pause the game at any time, press the RUN/STOP key. To exit a match before it's over, press SHIFT-Q.

Game Tips

There are several playing strategies that you might like to try. If you fire a spheroid into the teleporter, occasionally it will materialize next to your opponent, destroying his or her craft in the process. Also, try using the mounds and depressions for bank shots.

At times, your craft will fall into a depression. If you simply thrust in the direction that you want to go, it will take you awhile to escape. The quickest way to get out of a depression is by rocking your hovercraft back and forth until you gain enough momentum to escape.

Sometimes, several spheroids will appear very close together. If you hold down the fire button and maneuver around them, you'll fire a deadly volley in the direction you're traveling. Firing a stream of spheroids into the teleporter is almost certain death for your opponent. Since the teleported spheroids materialize in different locations, your opponent will have a hard time evading all of them.

SPHEROIDS.BOOT

```
BS 10 Q$=CHR$(34)
RF 20 POKE53281,0:POKE53280,0
FS 30 PRINT"{8}{CLR}LOADING SP
      HEROIDS..."
HB 40 PRINT"{BLK}{HOME}
      {2 DOWN}POKE43,1:POKE44,
      40:POKE10240,0:NEW"
BB 50 PRINT"{2 DOWN}LO"Q$"SPHE
      RE.ML"Q$",8,1"
RH 60 PRINT"{4 DOWN}NEW"
MM 70 PRINT"{2 DOWN}LO"Q$"SPHE
      RE.BAS"Q$",8"
AM 80 PRINT"{4 DOWN}RUN{HOME}"
      ;
FQ 90 POKE198,5:POKE631,13:POK
      E632,13:POKE633,13:POKE6
      34,13:POKE635,13
```

SPHEROIDS.BASIC

```
HQ 10 REM COPYRIGHT 1990 COMPU
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XQ 20 POKE54296,15:POKE53280,0
      :POKE53281,0:SYS2636:DIM
      P$(4)
PX 30 P$(0)="{RVS}{3 SPACES}
      {DOWN}{3 LEFT}{3 SPACES}
      "
SR 40 P$(1)="{OFF}AB{RVS} {UP}
      {2 LEFT}{OFF}CD"
BC 50 P$(2)="{OFF}EF{DOWN}
      {2 LEFT}{RVS} {OFF}GH"
RC 60 P$(3)="{OFF}IJ{RVS}
      {DOWN}{2 LEFT}{OFF}KL"
PP 70 P$(4)="{OFF}MN{UP}
      {2 LEFT}{RVS} {OFF}OP"
CD 80 FORI=1TO6:READT$(I):NEXT
      :S$=T$(1)
HE 90 DATA "OPEN{4 SPACES}","L
      ATTICE ","DIAMONDS","CYC
      LONE ","QUADRATE","RANDO
      M{2 SPACES}"
KX 100 T1$="{A}*{S}{A}*{S}{R}
       {SPACE}{R}{A}*{S}{A}*
       {S}{A}*{S}{A}{R}{S}{R}*
       {S}{A}*{S}"
GP 110 T2$="{Z}*{S}{Q}*{X}{Q}*
       {W}{Q}* {Q}{R}{X}- - -
       {SPACE}- -{Z}*{S}"
JF 120 T3$="{Z}*{X}{E}
       {2 SPACES}{E} {E}{Z}*
       {X}{E}{Z}{X}{Z}*{X}{Z}
       {E}{X}{E}*{X}{Z}*{X}"
SR 130 TC$="{WHT}{8}{5}{4}{2}
       {RED}{1}{3}{YEL}"
QB 140 GOSUB2280
PC 150 PRINT"{CLR}";
GC 160 S=1:MO=1:GOTO380
PB 170 PRINT"{HOME}{3}{RVS} SE
       LECTED: ";T$(S);"
       {5 SPACES}SHOWN: ";S$;"
       "
AC 180 POKE198,0
QE 190 GETA$
KQ 200 J=(PEEK(56320)ANDPEEK(5
       6321))
AH 210 IFA$="{F5}"THENGOSUB133
       0:GOSUB1390
QH 220 IFA$="{F7}"THENGOSUB133
       0:SYS2633:SYS2624:GOTO4
       50
KR 230 IF(JAND16)=0THENGOSUB13
       30:SYS2633:SYS2624:GOTO
       450
GK 240 IFA$="{F3}"THEN320
XA 250 IF(JAND8)=0THEN320
EA 260 IFA$="{F4}"THEN350
HG 270 IF(JAND4)=0THEN350
DG 280 IFA$="{F1}"THEN380
XD 290 IF(JAND1)=0OR(JAND2)=0T
       HEN380
BC 300 IFA$="{F8}"THENGOSUB133
       0:GOSUB2280:SYS2633:GOT
       0450
CJ 310 GOTO190
CS 320 S=S+1:IFS=7THENS=1
EJ 330 GOSUB1330
AK 340 GOTO170
GC 350 S=S-1:IFS=0THENS=6
JM 360 GOSUB1330
QQ 370 GOTO170
PF 380 PRINT"{HOME}{RVS}{3} GE
       NERATING ";T$(S);"
       {19 SPACES}":POKE1024+3
       9,160
FH 390 POKE55296+39,10
XS 400 POKE218,PEEK(218)OR128
HX 410 GOSUB1330
BR 420 ON S GOSUB1740,1790,143
       0,1590,2120,1950
PA 430 S$=T$(S)
GK 440 SYS2630
QB 450 IFMO=1THENGOSUB1130
ED 460 GOSUB1330
JC 470 GOTO170
PX 480 REM DRAW MOUND/DEPRESSI
       ON
BA 490 PRINTMID$(C$,1,1);
RA 500 FORI=1TOX
DF 510 PRINTP$(1);"{UP}";
EB 520 NEXT
GJ 530 PRINTMID$(C$,2,1);"
       {DOWN}";
RF 540 FORI=1TOX
HK 550 PRINTP$(2);"{DOWN}";
EE 560 NEXT
SJ 570 FORI=1TO2*X
KA 580 PRINT"{3 LEFT}";
JH 590 NEXT
BJ 600 PRINTMID$(C$,3,1);
SK 610 FORI=1TOX
FC 620 PRINTP$(3);"{DOWN}";
FJ 630 NEXT
FK 640 PRINTMID$(C$,4,1);"{UP}
       ";
SM 650 FORI=1TOX
BB 660 PRINTP$(4);"{UP}";
FP 670 NEXT
SF 680 PRINT"{UP}";
DM 690 IF X=1 THEN920
ME 700 FORJ=X-1TO1STEP-1
MD 710 FORI=1TOJ*2+1:PRINT"
       {3 LEFT}";:NEXT
KD 720 PRINTMID$(C$,1,1);
DE 730 FORI=1TOJ
HM 740 PRINTP$(0);"{3 UP}";
HA 750 NEXT
MS 760 PRINTMID$(C$,2,1);"
       {2 DOWN}";
DK 770 FORI=1TOJ
SM 780 PRINTP$(0);"{DOWN}";
HD 790 NEXT
HP 800 FORI=1TO2*J
BC 810 PRINT"{3 LEFT}";
GE 820 NEXT
EK 830 PRINTMID$(C$,3,1);
ER 840 FORI=1TOJ
XS 850 PRINTP$(0);"{DOWN}";
GH 860 NEXT
HS 870 PRINTMID$(C$,4,1);"
       {2 UP}";
ES 880 FORI=1TOJ
KQ 890 PRINTP$(0);"{3 UP}";
BK 900 NEXT
RM 910 NEXT
XS 920 RETURN
EB 930 REM DRAW TELEPORTER
ED 940 X=INT(RND(0)*38)
PC 950 Y=INT(RND(0)*23)+1
PS 960 IF(PEEK(55296+Y*40+X)AN
       D15)<>4THEN930
KR 970 IF(PEEK(55296+Y*40+X+1)
       AND15)<>4THEN930
FK 980 IF(PEEK(55296+Y*40+X+40
       )AND15)<>4THEN930
DP 990 IF(PEEK(55296+Y*40+X+41
       )AND15)<>4THEN930
AB 1000 REM ENTER HERE FOR SET
        LOCATION
HA 1010 POKE1024+Y*40+X,102
QG 1020 POKE1024+Y*40+X+1,102
CA 1030 POKE1024+Y*40+X+40,102
XD 1040 POKE1024+Y*40+X+41,102
JM 1050 POKE55296+Y*40+X,7
BG 1060 POKE55296+Y*40+X+1,7
QG 1070 POKE55296+Y*40+X+40,7
AA 1080 POKE55296+Y*40+X+41,7
DA 1090 M=1024+Y*40+X
RE 1100 L=M AND 255:H=INT(M/25
        6)
PB 1110 POKE2639,L:POKE2640,H
HH 1120 RETURN
JJ 1130 REM DISPLAY MENU
RX 1140 MO=1
FQ 1150 GOSUB1240
BA 1160 PRINT"{HOME}{DOWN}{1}
        {RIGHT}{RVS}{K}F1 GENE
        RATE SELECTED TERRAIN
        {OFF}{K}"
KA 1170 PRINT"{RIGHT}{RVS}{K}F
        3 INCREASE SELECTED TE
        RRAIN{OFF}{K}"
FH 1180 PRINT"{RIGHT}{RVS}{K}F
        4 DECREASE SELECTED TE
        RRAIN{OFF}{K}"
DH 1190 PRINT"{RIGHT}{RVS}{K}F
        5 MENU ON/OFF
        {14 SPACES}{OFF}{K}"
JJ 1200 PRINT"{RIGHT}{RVS}{K}F
        7 START BATTLE
        {13 SPACES}{OFF}{K}"
MB 1210 PRINT"{RIGHT}{RVS}{K}F
        8 RETURN TO TITLE SCRE
        EN{3 SPACES}{OFF}{K}"
HK 1220 PRINT"{RIGHT}{C}{RVS}
        {28 I}{OFF}{V}"
CQ 1230 RETURN
KB 1240 REM CLR LOGICAL LINES ▷
```

Spheroids

```
PF 1250 FORI=217TO242
GF 1260 POKEI,PEEK(I)OR128
DB 1270 NEXT
CA 1280 RETURN
SG 1290 REM SELECT DEPRESSION
        {SPACE}OR MOUND
PB 1300 IFRND(0)<.5THENC$="
        {BLU}{7}{4}{CYN}":GOTO
        1320
EH 1310 C$="{8}{4}{WHT}{5}"
MD 1320 RETURN
DA 1330 REM BEEP
GS 1340 POKE54272,0:POKE54273,
        200
HF 1350 POKE54277,0:POKE54278,
        244
KR 1360 POKE54276,33:FORI=1TO1
        00:NEXT
FX 1370 POKE54276,32
JG 1380 RETURN
CX 1390 REM TOGGLE MENU ON/OFF
DG 1400 IF MO=1THENMO=0:SYS263
        3:RETURN
KR 1410 GOSUB1130
AJ 1420 RETURN
DJ 1430 REM DIAMONDS
DE 1440 SYS2627
SD 1450 POKE781,12:POKE782,6:P
        OKE783,0:SYS65520
QE 1460 GOSUB1290
PJ 1470 X=2:GOSUB480
DR 1480 POKE781,12:POKE782,22:
        POKE783,0:SYS65520
FG 1490 GOSUB1290
AK 1500 X=2:GOSUB480
GH 1510 POKE781,6:POKE782,14:P
        OKE783,0:SYS65520
CK 1520 GOSUB1290
KX 1530 X=2:GOSUB480
DD 1540 POKE781,18:POKE782,14:
        POKE783,0:SYS65520
PM 1550 GOSUB1290
RC 1560 X=2:GOSUB480
EH 1570 X=19:Y=12:GOSUB1000
XF 1580 RETURN
SD 1590 REM CYCLONE
PX 1600 SYS2627
AK 1610 POKE781,3:POKE782,1:PO
        KE783,0:SYS65520
CE 1620 GOSUB1290:X=1:GOSUB480
KB 1630 POKE781,3:POKE782,33:P
        OKE783,0:SYS65520
JG 1640 GOSUB1290:X=1:GOSUB480
JA 1650 POKE781,21:POKE782,33:
        POKE783,0:SYS65520
SA 1660 GOSUB1290:X=1:GOSUB480
CM 1670 POKE781,21:POKE782,1:P
        OKE783,0:SYS65520
ED 1680 GOSUB1290:X=1:GOSUB480
HC 1690 POKE781,12:POKE782,5:P
        OKE783,0:SYS65520
CX 1700 GOSUB1290:X=5:GOSUB480
SR 1710 GOSUB930
BR 1720 RETURN
JS 1730 ;
HH 1740 REM OPEN
DJ 1750 SYS2627
CB 1760 GOSUB930
XB 1770 RETURN
JC 1780 ;
FM 1790 REM LATTICE
QM 1800 SYS2627
BR 1810 PRINT"{HOME}{DOWN}";
KC 1820 FORI=1TO12:PRINT"
        {RIGHT}";:T=7
KG 1830 IF(IAND1)=0THENPRINT"
        {3 RIGHT}";:T=6
GP 1840 FORJ=1TOT
XX 1850 IFRND(0)<.5THENPRINT"
        {BLU}A{7}H{DOWN}
        {2 LEFT}{4}I{CYN}P{UP}
        ";:GOTO1870
MC 1860 PRINT"{5}A{4}H{DOWN}
        {2 LEFT}{8}I{5}P{UP}";
XX 1870 PRINT"{4 RIGHT}";
QK 1880 NEXT
MR 1890 IFI=12THEN1920
FR 1900 PRINT"{DOWN}{3 LEFT}";
GQ 1910 IF(IAND1)=0THENPRINT"
        {3 RIGHT}";
EP 1920 NEXT
HP 1930 GOSUB930
MP 1940 RETURN
AE 1950 REM RANDOM
KH 1960 SYS2627
PH 1970 N=RND(0)/1.5
XA 1980 PRINT"{HOME}{3 DOWN}";
QG 1990 FORK=1TO7:PRINT"
        {RIGHT}";:T=5
GQ 2000 IF(KAND1)=0THENPRINT"
        {3 RIGHT}";:T=4
KB 2010 FORL=1TOT
BP 2020 IFRND(0)>NTHENPRINT"
        {UP}{6 RIGHT}";:GOTO20
        50
QK 2030 GOSUB1290
GS 2040 X=1:GOSUB480
JB 2050 PRINT"{DOWN}{2 RIGHT}"
        ;
SD 2060 NEXT
HM 2070 PRINT"{2 DOWN}";
FA 2080 IF(KAND1)=0THENPRINT"
        {3 RIGHT}";
BE 2090 NEXT
EC 2100 GOSUB930
HC 2110 RETURN
CG 2120 REM QUADRATE
JB 2130 SYS2627
FH 2140 POKE781,7:POKE782,2:PO
        KE783,0:SYS65520
BJ 2150 GOSUB1290:X=INT(RND(0)
        *3)+1:IFX<3THENFORI=1T
        O3-X:PRINT"{3 RIGHT}";
        :NEXT
KJ 2160 GOSUB480
DB 2170 POKE781,17:POKE782,20:
        POKE783,0:SYS65520
FM 2180 GOSUB1290:IFX<3THENFOR
        I=1TO3-X:PRINT"
        {3 RIGHT}";:NEXT
CM 2190 GOSUB480
FP 2200 POKE781,5:POKE782,25:P
        OKE783,0:SYS65520
MP 2210 GOSUB1290:X=INT(RND(0)
        *2)+1:IFX=1THENPRINT"
        {3 RIGHT}";
XR 2220 GOSUB480
QB 2230 POKE781,19:POKE782,3:P
        OKE783,0:SYS65520
XR 2240 GOSUB1290:IFX=1THENPRI
        NT"{3 RIGHT}";
AX 2250 GOSUB480
JS 2260 GOSUB930
PS 2270 RETURN
JH 2280 REM TITLE SCREEN
GH 2290 PRINTCHR$(142);"{WHT}
        {H}{CLR}"
RK 2300 POKE53248+16,0
AH 2310 POKE2040,33:POKE2041,3
        4:POKE2042,34
DM 2320 POKE53248+38,2:POKE532
        48+39,14:POKE53248+40,
        10:POKE53248+41,5
PC 2330 POKE53248,142:POKE5325
        0,142:POKE53252,142
AP 2340 POKE53249,147:POKE5325
        1,187:POKE53253,227
CP 2350 POKE53248+28,7
HD 2360 PRINTTAB(6);T1$
GB 2370 PRINTTAB(6);T2$
KA 2380 PRINTTAB(6);T3$
BX 2390 PRINTTAB(12);"{DOWN}
        {5}COPYRIGHT 1990"
XS 2400 PRINTTAB(6);"{DOWN}
        {WHT}COMPUTE! PUBLICAT
        IONS, INC."
MB 2410 PRINTTAB(10);"{DOWN}
        {5}ALL RIGHTS RESERVED
        "
QB 2420 POKE53248+16,0
GF 2430 POKE53248+21,7
EH 2440 PRINT"{2 RIGHT}{WHT}
        {2 DOWN}BATTLE
        {14 SPACES}{BLU}AB{UP}
        {LEFT}C{7}F{DOWN}
        {LEFT}GH{7 SPACES}
        {WHT}MOUND"
FF 2450 PRINT"{2 RIGHT}CRAFT
        {15 SPACES}{4}IJ{DOWN}
        {LEFT}K{CYN}N{UP}
        {LEFT}OP{WHT}"
JM 2460 PRINT"{WHT}{2 RIGHT}
        {3 DOWN}UNARMED
        {13 SPACES}{8}AB{UP}
        {LEFT}C{4}F{DOWN}
        {LEFT}GH{2 SPACES}
        {WHT}DEPRESSION"
HF 2470 PRINT"{WHT}{2 RIGHT}SP
        HEROID{12 SPACES}{WHT}
        IJ{DOWN}{LEFT}K{5}N
        {UP}{LEFT}OP"
RH 2480 PRINT"{WHT}{2 RIGHT}
        {3 DOWN}ARMED
        {16 SPACES}{YEL}{2 +}
        {3 SPACES}{WHT}TELEPOR
        TER"
BJ 2490 X=0:Y=0
MP 2500 FORI=0TO8
JG 2510 T1=I
EC 2520 T2=I+1:IFT2>8THENT2=T2
        -9
HQ 2530 T3=I+2:IFT3>8THENT3=T3
        -9
GP 2540 PRINT"{HOME}{DOWN}";
HK 2550 PRINTTAB(6);MID$(TC$,T
        1+1,1);T1$
MQ 2560 PRINTTAB(6);MID$(TC$,T
        2+1,1);T2$
RD 2570 PRINTTAB(6);MID$(TC$,T
        3+1,1);T3$
QG 2580 POKE781,22:POKE782,23:
        POKE783,0:SYS65520
HD 2590 IFX=0THENX=1:PRINT"
        {RVS}{YEL}{2 +}{DOWN}
        {2 LEFT}{2 +}":GOTO261
        0
QH 2600 X=0:PRINT"{YEL}{2 +}
        {DOWN}{2 LEFT}{2 +}"
MH 2610 GETA$:IFA$<>""THENY=1:
        I=8
SB 2620 J=(PEEK(56320)ANDPEEK(
        56321))
FM 2630 IF(JAND1)=0OR(JAND2)=0
        OR(JAND4)=0OR(JAND8)=0
        OR(JAND16)=0THENY=1:I=
        8
AB 2640 NEXTI
XP 2650 IFY=1THEN2670
FK 2660 GOTO2500
AR 2670 POKE53248+21,0
CJ 2680 RETURN
```

SPHEROIDS.ML

```
0801:16 08 E8 03 8F 20 53 50 5F
0809:48 45 52 4F 49 44 53 20 EF
0811:42 4F 4F 54 00 2B 08 F2 F4
0819:03 8F 20 42 59 20 4B 45 DD
0821:56 49 4E 20 44 49 58 4F C1
0829:4E 00 4B 08 FC 03 8F 20 7D
0831:41 55 47 20 31 2C 20 31 CD
0839:39 38 39 20 2D 20 41 00 89
0841:C0 00 03 B0 00 03 B0 00 8A
0849:0E AC 00 0E AC 00 3A AB F1
0851:00 3A AB 00 0E AC 00 0E 96
0859:AC 00 03 B0 00 03 B0 00 98 ▷
```

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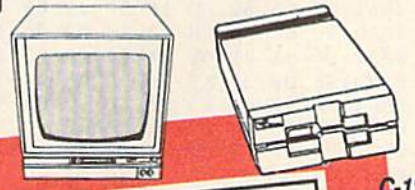
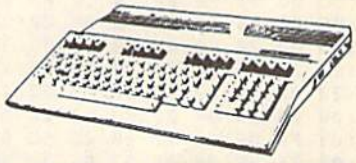


C128D



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Spheroids

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0861:00 C0 00 00 00 00 00 00 A1
0869:00 00 00 00 00 00 00 00 79
0871:00 00 00 00 00 00 00 00 81
0879:00 00 00 00 00 00 00 00 89
0881:00 00 00 00 00 00 00 00 91
0889:00 C0 00 03 B0 00 0E AC 48
0891:00 0E AC 00 03 B0 00 00 95
0899:C0 00 00 00 00 00 00 00 0A
08A1:00 00 00 00 00 00 00 00 B1
08A9:00 00 00 00 00 00 00 00 B9
08B1:00 00 00 00 00 00 00 00 C1
08B9:00 00 00 00 00 00 00 00 C9
08C1:00 00 00 00 00 00 00 00 D1
08C9:00 00 00 00 00 00 00 C0 9A
08D1:00 03 70 00 03 70 00 00 8A
08D9:C0 00 00 00 00 00 00 00 4A
08E1:00 00 00 00 00 00 00 00 F1
08E9:00 00 00 00 00 00 00 00 F9
08F1:00 00 00 00 00 00 00 00 02
08F9:00 00 00 00 00 00 00 00 0A
0901:00 00 00 00 00 00 00 00 13
0909:00 00 00 03 C0 00 03 70 C7
0911:00 0D 70 00 0D 5C 00 03 51
0919:5C 00 03 F0 00 00 C0 00 4A
0921:00 00 00 00 00 00 00 00 33
0929:00 00 00 00 00 00 00 00 3B
0931:00 00 00 00 00 00 00 00 43
0939:00 00 00 00 00 00 00 00 4B
0941:00 00 00 00 00 00 C0 00 D4
0949:03 F0 00 0F 7C 00 0D 5C 64
0951:00 35 5F 00 35 57 00 3D E0
0959:57 00 0D 5C 00 0F 5C 00 73
0961:03 F0 C0 00 C0 00 00 00 37
0969:00 00 00 00 00 00 00 00 7B
0971:00 00 00 00 00 00 00 00 83
0979:00 00 00 00 00 00 00 00 8B
0981:C0 00 03 F0 00 0F 7C 00 98
0989:0D 5F 00 3D 57 00 35 57 4A
0991:C0 F5 55 C0 D5 57 C0 F5 BB
0999:57 00 35 57 00 3D 5C 00 21
09A1:0F FC 00 03 C0 00 00 00 B0
09A9:00 00 00 00 00 00 00 00 BB
09B1:00 00 00 00 00 00 00 00 C3
09B9:00 00 00 00 00 00 00 03 CE
09C1:C0 00 0D 7C 00 35 5C 00 2B
09C9:37 D7 00 37 37 00 D7 35 7F
09D1:C0 DC 0D C0 DC 35 C0 D7 3E
09D9:37 00 37 D7 00 37 DC 00 82
09E1:35 5C 00 0D 70 00 03 C0 C0
09E9:00 00 00 00 00 00 00 00 FB
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 00 00 0C
0A01:00 00 03 C0 00 0F F0 00 9F
0A09:0C 3C 00 0C 0C 00 3C 0F DA
0A11:00 30 03 00 30 0F 00 3C 8B
0A19:0C 00 0C 3C 00 0C 30 00 09
0A21:0F F0 00 03 C0 00 00 00 2F
0A29:00 00 00 00 00 00 00 00 3D
0A31:00 00 00 00 00 00 00 00 45
0A39:00 00 00 00 00 00 00 4C 99
0A41:D5 13 4C FC 12 4C 65 13 FD
0A49:4C 9B 13 4C F0 0B F3 05 32
0A51:01 01 01 01 01 01 01 02 66
0A59:02 05 05 05 05 05 05 08 EE
0A61:08 07 07 07 07 07 07 0C FA
0A69:0C 08 07 07 00 00 00 00 D6
0A71:00 00 00 00 00 00 00 00 85
0A79:00 00 00 00 00 00 00 00 8D
0A81:00 00 00 00 00 00 00 00 95
0A89:00 00 00 00 00 00 00 00 9D
0A91:00 00 00 00 00 00 00 00 A5
0A99:00 00 00 00 00 00 00 00 AD
0AA1:F8 F8 F8 F8 F8 F8 F7 F7 B2
0AA9:08 08 08 08 08 08 09 09 C0
0AB1:01 01 01 01 01 01 01 01 C5
0AB9:05 05 05 05 05 05 03 03 C7
0AC1:01 01 01 01 01 01 01 01 D5
0AC9:01 01 01 01 01 01 0B 0B FB
0AD1:03 03 08 FF FF 00 00 80 A9
0AD9:20 80 6E 07 05 00 C0 01 07
0AE1:06 04 02 08 07 03 05 09 12
0AE9:FF FA FC FE F8 F9 FD FB F3
0AF1:F7 12 20 43 52 41 46 54 37
0AF9:53 20 20 00 9A 12 42 4C B1
0B01:55 45 20 57 49 4E 53 21 D7
0B09:00 1E 12 47 52 45 45 4E DD
0B11:20 57 49 4E 53 21 00 00 3A
0B19:00 01 03 0F 1F 7F FF 3F F6
0B21:7F FF FF FF FF FF FF 00 F6
0B29:00 00 00 00 01 07 0F 03 84
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0B81:E0 80 00 00 00 00 00 FF 28
0B89:FF FF FF FF FF FE FC FF 95
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0BD9:69 80 91 FB A0 28 B1 FB BB
0BE1:18 69 80 91 FB A0 29 B1 ED
0BE9:FB 18 69 80 91 FB 60 AD 24
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0C19:E6 FC E6 FE CA D0 F0 A5 D1
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0C29:09 01 8D 0E DC A0 00 B9 BB
0C31:18 0B 99 08 22 C8 C0 80 02
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0C41:BD 99 0A D0 65 DE CB 0A 35
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0C79:0C BD FA DB 29 04 D0 06 25
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0D51:A9 F7 9D A1 0A 60 8A A8 9B
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0D69:99 91 0A 8A 48 98 AA 20 B8
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0F69:0A 68 AA 60 8E DC 0A 8C 8A
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0F79:E0 0F B9 99 0A F0 03 4C 03
0F81:E0 0F 8A 0A AA 98 0A A8 3A
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1019:0A 8A 99 71 0A 98 9D CE E7
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1029:0A 60 A9 00 8D 79 0A 8D 8F
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10A1:D4 A9 0A 8D 01 D4 60 8A 57
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10B9:DE 79 0A 4C F9 10 A9 0A 1B
10C1:9D 27 D0 98 DD 71 0A D0 B7
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1129:BD FA DB 29 04 D0 05 A9 0E
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1139:08 D0 05 A9 09 99 89 0A 9A
1141:B9 89 0A D0 08 B9 91 0A 45
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11B9:F0 09 AD 6E 0A 8D 08 D4 9E
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11C9:A9 80 8D 0B D4 60 A0 00 AC
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11D9:00 D8 C8 C0 28 D0 F1 A9 69
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11E9:FF A9 F2 A0 0A 20 1E AB 97
11F1:A9 20 20 D2 FF A0 1E A2 83
11F9:00 18 20 F0 FF A9 1E 20 38
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1209:AB A9 05 8D 27 D8 20 16 D9
1211:12 20 31 12 60 A0 08 A2 C5
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1221:D2 FF A9 12 20 D2 FF AE FF
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1249:CD BD 60 8D DB 0A 98 38 19
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1269:AA 60 A9 00 85 FD A9 04 AB
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1281:FE 85 FE 88 D0 F0 18 8A F3
1289:65 FD 85 FD A9 00 65 FE 87
1291:85 FE 60 8D DB 0A BD 00 9F
1299:D0 4A 48 AD DB 0A F0 04 89
12A1:68 09 80 48 68 60 A0 27 FD
12A9:A9 A0 99 00 04 8A 99 00 7B
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12C1:F6 AD 00 DC 2D 01 DC 29 EA
12C9:10 F0 F6 60 A9 20 8D 04 04
12D1:D4 A9 80 8D 0B D4 A9 80 33
12D9:8D 12 D4 60 20 E1 FF D0 43
12E1:19 A9 00 8D 18 D4 20 E1 0C
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12F1:20 E1 FF F0 FB A9 0F 8D DF
12F9:18 D4 60 A9 13 20 D2 FF C4
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1309:D2 FF A0 0C A2 0D A9 DB E5
1311:20 D2 FF A9 C0 20 D2 FF C2
1319:A9 C0 20 D2 FF CA D0 EE 31
1321:A9 DB 20 D2 FF A2 0D A9 92
1329:DD 20 D2 FF A9 20 20 D2 81
1331:FF A9 20 20 D2 FF CA D0 C4
1339:EE C0 01 F0 08 A9 DD 20 F8
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1359:FF A9 20 20 D2 FF A9 13 EC
1361:20 D2 FF 60 A0 00 B9 28 F2
1369:04 99 00 C0 B9 28 D8 99 BD
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13B1:C5 99 28 D9 B9 00 C2 99 B0
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13C9:28 07 B9 00 C7 99 28 DB CD
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13E1:00 D4 8D 05 D4 8D 07 D4 FE
13E9:8D 0C D4 A9 0A 8D 01 D4 6C
13F1:A9 20 8D 04 D4 A9 F2 8D A7
13F9:06 D4 A9 80 8D 0B D4 8D 65
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1409:FF 8D 0E D4 A9 FF 8D 0F 1B
1411:D4 A9 31 8D 13 D4 A9 F6 43
1419:8D 14 D4 A9 07 8D 25 D0 CB
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1429:2D D0 A9 05 8D 2E D0 A9 12
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1469:0C D0 A9 EE 8D 0D D0 A9 DB
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1479:D0 A9 21 8D FE 07 8D FF A0
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1489:D0 8D 29 D0 8D 2A D0 8D F3
1491:2B D0 8D 2C D0 A9 80 8D B3
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14A9:0F A9 02 8D D8 0A A9 FD 1D
14B1:8D D9 0A A2 01 20 1A 0F 4E
14B9:A9 04 8D D8 0A A9 FB 8D 73
14C1:D9 0A A2 02 20 1A 0F A9 FE
14C9:08 8D D8 0A A9 F7 8D D9 37
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14D9:8D D8 0A A9 EF 8D D9 0A 4E
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14F9:D4 A2 00 A9 00 9D 6D 0A 2B
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1519:0A 8D A3 0A 8D A4 0A 8D 61
1521:A5 0A 8D A6 0A 8D A7 0A 9C
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1541:0B CE 6B 0A F0 03 4C 54 33
1549:14 4C 60 17 AD 70 0A F0 42
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1559:14 4C 43 17 20 98 0B 20 14
1561:DD 12 20 AD 0B 20 B7 0B 31
1569:20 78 10 20 AC 11 A2 06 BA
1571:20 41 0C A2 07 20 41 0C EE
1579:A9 01 8D D8 0A A9 FE 8D 7A
1581:D9 0A A2 00 20 E0 0C 20 2C
1589:88 0E 20 57 0E A9 40 8D 1A
1591:DA 0A A0 06 20 A8 10 A9 8D
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1751:F0 FF A9 FD A0 0A 20 1E 98
1759:AB 20 B8 12 4C 7A 17 20 38
1761:CD 12 A2 05 20 A7 12 A0 04
1769:0E A2 00 18 20 F0 FF A9 37
1771:0A A0 0B 20 1E AB 20 B8 C8
1779:12 A9 00 8D 15 D0 20 CD ED
1781:12 60 FF 00 00 00 00 00 D0
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STARBURST GRAPHICS

EDITOR'S CHOICE

Looking for a way to impress your friends? Try *Starburst Graphics*. This powerful machine language program features more than 20 options for creating colorful, stunning graphics on the 64's high-resolution screen.

With *Starburst Graphics*, you begin with a basic star cluster that emerges from the center of the screen. From there, you can easily manipulate the paths of the streaming stars to simulate fireworks, spiral nebulas, ocean waves, swirls, kaleidoscopes, and much more.

Getting Started

Since *Starburst Graphics* is written entirely in machine language, you'll need to type it in using *MLX*, the machine language entry program located elsewhere in this issue. The *MLX* prompts, and the values you should enter, are as follows:

Starting address: 0801
Ending address: 15C8

When you've finished typing, be sure to save a copy of the program before exiting *MLX*.

Although *Starburst Graphics* is written in machine language, it loads and runs like a BASIC program. When you run it, the title screen with a list of command options will appear (see accompanying table). This list serves only as a reference; the commands don't have any effect until the graphics screen is displayed.

To start the show, press any key. You'll see a series of "stars" streaming outward from the center of the screen. Before you continue, you may want to adjust your screen's brightness and color until the stars appear in distinct contrast to the background. (For a really dazzling display, turn off the lights in the room.) Then you're ready to try *Starburst Graphics'* many options.

Each command option in *Starburst Graphics* is activated using a specific keypress. You can press any command key at any time, in whatever order you like. Each time you activate an option, that function remains active until you turn it off. You can also combine several options, one after another, to produce a great variety of graphics patterns.

Create a menagerie of scintillating hi-res displays with this unique graphics entertainment program for the 64.

Bob Masters

Most of *Starburst Graphics'* commands toggle on and off. To activate a particular option, press the corresponding command key once; to deactivate it, press the same key a second time. Also, should your star pattern become a jumbled mess, use the master control key D to return all options to their default condition.

A Galaxy of Options

Initially, the stars appear as colored dots moving across the screen. To make them leave a trail of "dust," press the C key (for continuous drawing); to disable this option, press C again. Press a digit (1–9) to give each star a tail; the higher the digit, the longer the tail. To turn off the tails option, press either 0 or T.

Normally, the stars go offscreen when they reach the border and are replaced by new stars. To force the existing stars to remain on the screen, press J or B. Pressing J makes the stars jump back in the direction from which they came; pressing B makes them bounce off the borders.

To change the number of stars, press N. You'll be asked how many stars you want to see. Enter a value in the range 1–256 (the default is 80), or press RETURN if you decide that you're satisfied with the current number.

Stars appear in three colors. To cycle these, press f1, f3, and f5. The f7 key restores the default colors.

To mirror the star pattern horizontally, press the X key; to mirror it vertically, press Y.

If the screen becomes cluttered, press CLR/HOME. After the screen is cleared, the stars will resume their movements at the points from which they were erased. This option is especially useful when you've produced a great design but find it's becoming lost on a crowded screen.

The space bar works almost the same as the CLR/HOME key. The stars are erased, but their paths are changed. Each star returns to its starting position and is assigned a new speed and direction. This option can be really handy. For instance, when you're using bounce or jump or you're in atom mode (see below), each star tends to stay on the screen indefinitely. So, to force the stars offscreen and replace them with new stars that travel in different directions, you'd press the space bar.

To pause the graphics display, hold down SHIFT or press SHIFT LOCK.

Four Primary Patterns

There are four special directional patterns: fountain, spiral, atom, and ocean.

Press F for a fountain (or fireworks) effect, S for a spiral motion, A to make the stars appear like atomic electrons, and O to produce an oscilloscopic or oceanic wave effect.

Examine these four options in turn by pressing the respective key. Between patterns, press D to restore the default display. For an interesting wave effect, try the following sequence: Type DN and set the number of stars to 12; then type OCVBXY (the V command is described in the next couple of paragraphs). To change this pattern, periodically press the space bar.

Each star moves at its own random speed and direction. All together, there are 14 different speeds. To increase the average star velocities, press V. This increases the range of possible speeds—and directions—available for each star. Notice that sometimes the stars are more interesting to watch when they're moving slower.

Note, too, that although V will increase the average speed, the velocities are also affected by the number of stars present; the fewer the stars on the screen, the faster they move. Sometimes, when there are only a handful of stars, even the slower ones move too quickly to watch. When this happens, press P. This puts a speed limit on the stars.

Notice the difference between the velocity option and the speed limit. The V command is your primary speed and directional control. You'll use it fairly often; P is used only when things get much too fast. To see what is meant by this, type DF3N and set the number of stars to 4. Watch how fast the stars fly by. Now alternately press P and V to see the effect of each keypress.

You can control the size of the graphics display screen by pressing H or W; H changes the height of the screen, while W changes its width. You can use these two keys separately or together to produce four different height and width combinations.

Other Options

Normally, all stars flow from the center of the screen. Press Q and they will burst out from all over the place. The program, however, will attempt to group the stars so that several appear together.

A variation on this pattern can be achieved using the Z option. The stars will still have random starting points, but they won't be grouped into clusters. For an example of this, type DN and set the number of stars to 100; then type ZW. This creates a swirling pattern similar to a Star Trek transporter beam.

For random star movement, press R. This command can be used to create kaleidoscopic effects. For example, try this command combination: DQRXYC. Press the space bar now and then for a new pattern. Note that when random movement is in effect, the tails option operates differently. The tail length (1–9) determines how far the stars travel before changing direction. Randomly moving tails also add a twist to the directional options (F, S, A, and O).

To limit the lifespan of each star, press L. This command makes the stars slow down and disappear sooner than they normally would. This option isn't needed most of time, but it can be effective with fireworks or random movements.

To make all stars appearing on the screen at the same time the same color, press U (for unicolor mode). This command is especially useful with fireworks. For example, try the command sequence DFVQLU2 and observe how each command contributes to the final result.

The Sky's the Limit

If you ever forget which key corresponds to which function, press M to return to the options menu. You'll be able to use any option after you have returned to the graphics screen.

You can have a lot of fun with *Starburst Graphics*. Just experiment with the many different command combinations. It will take you awhile to realize all of the artistic possibilities. In the meantime, bon voyage on your journey to the stars!

Starburst Graphics Commands

Keypress	Command	Keypress	Command
X	Mirror horizontally	M	This menu
Y	Mirror vertically	O	Ocean
B	Bounce	F	Fountain
J	Jump back	S	Spiral
1–9	Tail length	A	Atom
0 or T	Turn off tails	Space	Clear screen and restart all stars
C	Continuous drawing		
N	Number of stars		
U	Unicolor bursts	HOME	Clear screen but continue stars where they left off
f1–f5	Change colors		
f7	Reset all colors		
D	Defaults restored		
H	Height of screen	R	Random moves
W	Width of screen	V	Velocity
Q	Random start for whole burst	P	Speed limit
		SHIFT	Pause
Z	Random start for each star	L	Limited life
		RUN/STOP	Exit

Starburst Graphics

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 A9 00 8D 21 3B
0811:D0 8D 20 D0 20 8A 0F A9 F0
0819:20 A0 00 8C A0 17 8D 68 0F
0821:18 8C 30 19 8C 58 19 A2 92
0829:06 B9 A0 17 18 69 01 99 32
0831:A1 17 B9 68 18 69 00 99 95
0839:69 18 C8 CA 10 EB C0 C7 43
0841:F0 15 B9 A0 17 18 69 39 75
0849:99 A1 17 B9 68 18 69 01 84
0851:99 69 18 C8 4C 28 08 A0 CB
0859:00 B9 30 19 18 69 08 99 7F
0861:31 19 B9 58 19 69 00 99 15
0869:59 19 C8 C0 27 D0 EA A9 8D
0871:52 85 F8 A9 06 85 F9 A9 A9
0879:C8 85 9F A9 28 85 9E 85 F7
0881:BF A9 4F 85 BE 85 AB A9 2B
0889:09 85 9B A9 04 85 9C A9 A6
0891:00 A0 05 99 B0 00 99 A5 62
0899:00 88 10 F7 8D CB 16 A9 BE
08A1:0B 8D 11 D0 20 0A 0F A9 BA
08A9:00 85 B6 20 21 0F A0 80 FA
08B1:8C 18 D4 A9 FF 8D 0E D4 6A
08B9:8D 0F D4 8C 12 D4 A6 BE A7
08C1:A9 00 85 FA 20 4A 0F CA 1A
08C9:A5 AA F0 04 E4 BF 90 04 01
08D1:E0 FF D0 EC A9 01 85 FA 92
08D9:A9 D8 85 FE A9 04 85 FC FA
08E1:AA A0 00 84 FB 84 FD A5 4B
08E9:F8 91 FB A5 F9 91 FD C8 8F
08F1:D0 F5 E6 FC E6 FE CA D0 2E
08F9:EE A9 1D 8D 18 D0 A9 D8 98
0901:8D 16 D0 A9 3B 8D 11 D0 17
0909:A9 00 85 A2 AC 11 D0 AD C3
0911:12 D0 D0 04 A9 FA A0 00 35
0919:38 E9 01 85 C4 84 F7 C6 29
0921:B6 10 04 A9 04 85 B6 A5 F6
0929:A5 D0 2B A6 BE A5 AA D0 C4
0931:18 A4 C4 CC 12 D0 D0 FB 4F
0939:AD 11 D0 45 F7 30 F4 20 5F
0941:4F 0D CA E0 FF D0 F8 F0 CB
0949:0D BD 80 1E D0 03 20 4F 65
0951:0D CA E4 BF B0 F3 A5 A9 7F
0959:29 02 F0 03 20 21 0F AD 20
0961:1B D4 29 03 C9 03 F0 F7 BF
0969:0A 0A 0A 8D C5 16 A5 A6 95
0971:F0 08 A5 A2 F0 FC A9 00 AB
0979:85 A2 CE CC 16 A6 BE BD 24
0981:80 1C C9 80 F0 57 A5 AA F6
0989:F0 0F BD 80 1E F0 0A E4 45
0991:BF 90 03 DE 80 1E 4C 48 53
0999:0A A9 03 8D C9 16 CE C9 62
09A1:16 30 3A A5 A8 F0 08 AD 33
09A9:CC 16 10 03 20 28 10 A5 41
09B1:B6 29 01 F0 0E A5 B4 F0 F9
09B9:03 20 AC 0E A5 B3 F0 03 AC
09C1:20 DD 0C BD 80 19 18 7D CE
09C9:80 1C A8 38 E5 B2 C5 9F E0
09D1:B0 07 98 9D 80 19 4C F3 DF
09D9:09 A5 B0 D0 06 20 4A 0F 51
09E1:4C 48 0A 20 5C 0E A5 B0 86
09E9:C9 01 F0 B2 20 68 0E 4C 75
09F1:9F 09 BD 80 1B 18 7D 80 8A
09F9:1D 85 C3 C9 08 90 1E BD 8D
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0A01:80 1A A8 BD 80 1D 10 04 69
0A09:C8 4C 0E 0A 88 98 38 E5 F3
0A11:B1 C5 9E B0 0E 98 9D 80 DC
0A19:1A A5 C3 29 07 9D 80 1B 79
0A21:4C 3D 0A A5 B0 D0 06 20 3B
0A29:4A 0F 4C 48 0A 20 68 0E E3
0A31:A5 B0 C9 01 F0 BC 20 5C A4
0A39:0E 4C 9F 09 A5 AA F0 04 A9
0A41:E4 BF B0 03 20 47 0D CA 01
0A49:E0 FF F0 03 4C 80 09 AD 40
0A51:CC 16 10 06 AD CB 16 8D 0A
0A59:CC 16 AC 11 D0 AD 12 D0 32
0A61:D0 04 A9 FA A0 00 38 E9 23
0A69:01 85 C4 84 F7 AD 8D 02 D3
0A71:D0 FB A5 91 30 01 00 A5 E5
0A79:C6 D0 03 4C 20 09 A9 00 C2
0A81:85 C6 AD 77 02 C9 44 D0 C7
0A89:03 4C 70 08 C9 4E D0 03 EC
0A91:4C 72 10 C9 42 D0 0B A5 18
0A99:B0 49 01 29 01 85 B0 4C D6
0AA1:69 0C C9 4A D0 0B A5 B0 F9
0AA9:49 02 29 02 85 B0 4C 69 19
0AB1:0C C9 56 D0 0F A5 9B 49 A5
0AB9:18 85 9B A5 9C 49 0C 85 B0
0AC1:9C 4C 20 09 C9 57 D0 1C 35
0AC9:A5 9E C9 28 F0 0B A9 28 43
0AD1:85 9E A9 00 85 B1 4C A0 B1
0AD9:08 A9 09 85 9E A9 0F 85 15
0AE1:B1 4C A0 08 C9 48 D0 1C A3
0AE9:A5 9F C9 C8 F0 0B A9 C8 4E
0AF1:85 9F A9 00 85 B2 4C A0 16
0AF9:08 A9 40 85 9F A9 44 85 8E
0B01:B2 4C A0 08 C9 58 D0 09 72
0B09:A5 B5 49 02 85 B5 4C EC 31
0B11:10 C9 59 D0 09 A5 B5 49 6D
0B19:01 85 B5 4C EC 10 C9 43 0B
0B21:D0 11 A5 A5 49 01 85 A5 F1
0B29:A5 AA F0 13 A9 00 85 AA 0F
0B31:4C EC 10 C9 5A D0 0B A5 19
0B39:A9 49 01 29 01 85 A9 4C E6
0B41:20 09 C9 51 D0 0B A5 A9 9F
0B49:49 02 29 02 85 A9 4C 20 55
0B51:09 C9 46 D0 08 A5 B3 49 BB
0B59:01 29 01 10 22 C9 4F D0 03
0B61:08 A5 B3 49 02 29 02 10 B8
0B69:16 C9 41 D0 08 A5 B3 49 B9
0B71:04 29 04 10 0A C9 53 D0 44
0B79:0B A5 B3 49 08 29 08 85 04
0B81:B3 4C 69 0C C9 55 D0 09 C0
0B89:A5 A7 49 01 85 A7 4C 20 19
0B91:09 C9 13 D0 06 20 0A 0F E1
0B99:4C 20 09 C9 4C D0 09 A5 F8
0BA1:B4 49 01 85 B4 4C 69 0C 92
0BA9:C9 52 D0 1F A5 A8 49 01 A8
0BB1:85 A8 F0 0F AD CB 16 8D 1A
0BB9:CC 16 F0 83 A9 00 85 AA 15
0BC1:4C EC 10 AD CB 16 D0 6D DB
0BC9:4C 20 09 C9 85 D0 16 A5 0D
0BD1:F8 29 F0 85 C3 A5 F8 18 E3
0BD9:69 01 29 0F F0 F9 05 C3 38
0BE1:85 F8 4C D5 08 C9 86 D0 25
0BE9:0E A5 F8 18 69 10 C9 10 40
0BF1:90 F9 85 F8 4C D5 08 C9 A2
0BF9:87 D0 0E A5 F9 18 69 01 28
0C01:29 0F F0 F9 85 F9 4C D5 B1
0C09:08 C9 88 D0 0B A9 52 85 DE
0C11:F8 A9 06 85 F9 4C D5 08 DD
0C19:C9 54 D0 02 A9 30 C9 30 37
0C21:90 21 C9 3A B0 1D 29 0F 02
0C29:8D CB 16 8D CC 16 A4 A8 47
0C31:F0 03 4C 20 09 A0 00 84 5D
0C39:A5 0A 0A 6D CB 16 85 AA 2B
0C41:4C EC 10 C9 4D D0 06 20 33
0C49:8A 0F 4C A0 08 C9 50 D0 D6
0C51:0D A5 A6 49 01 85 A6 A9 D7
0C59:00 85 A2 4C 20 09 C9 20 C4
0C61:D0 03 4C A0 08 4C 20 09 F0
0C69:A5 AA F0 22 20 0A 0F A9 30
0C71:00 85 FA A6 BE A4 BF 88 45
0C79:B9 80 1E F0 06 20 4A 0F B5
0C81:4C 87 0C 20 A0 0C CA 88 78
0C89:10 EE A9 01 85 FA 4C 20 7B
0C91:09 86 03 8A 38 E5 BF AA 5C
0C99:20 55 0F 8A A8 A6 03 B9 41
0CA1:80 19 9D 80 19 B9 80 1A C6
0CA9:9D 80 1A B9 80 1B 9D 80 BB
0CB1:1B B9 80 1C 9D 80 1C B9 78
0CB9:80 1D 9D 80 1D B9 C5 15 85
0CC1:9D C5 15 B9 80 1C C9 80 E0
0CC9:D0 04 A9 00 F0 05 A5 AA 12
0CD1:38 E5 FA 9D 80 1E A9 00 88
0CD9:99 80 1E 60 A5 B3 C9 01 39
0CE1:D0 03 4C 74 0E A0 00 BD A4
0CE9:80 1A C9 14 90 02 A0 01 12
0CF1:84 BD A0 00 BD 80 19 C9 BB
0CF9:64 90 02 A0 02 98 05 BD EC
0D01:85 BD A5 B3 C9 02 F0 1C 91
0D09:C9 04 F0 21 A5 BD F0 0B 4A
0D11:C9 01 F0 0A C9 02 F0 09 50
0D19:4C 90 0E 4C 9E 0E 4C 74 3E
0D21:0E 4C 82 0E A5 BD 29 02 FE
0D29:F0 F4 4C 82 0E A5 BD 29 56
0D31:02 F0 06 20 82 0E 4C 3D 6D
0D39:0D 20 74 0E A5 BD 29 01 C8
0D41:F0 D9 4C 90 0E 60 A5 AA C4
0D49:F0 64 E4 BF 90 60 20 0F E2
0D51:0E A5 B5 D0 01 60 BD 80 25
0D59:19 48 BD 80 1A 48 BD 80 BF
0D61:1B 48 A5 B5 C9 03 D0 0C 33
0D69:A9 C7 38 FD 80 19 9D 80 55
0D71:19 20 0F 0E A5 B5 29 02 3B
0D79:F0 15 A9 27 38 FD 80 1A CD
0D81:9D 80 1A A9 07 38 FD 80 FD
0D89:1B 9D 80 1B 20 0F 0E A5 59
0D91:B5 29 01 F0 0C A9 C7 38 CE
0D99:FD 80 19 9D 80 19 20 0F 87
0DA1:0E 68 9D 80 1B 68 9D 80 CE
0DA9:1A 68 9D 80 19 60 20 1D 4E
0DB1:0E A5 B5 D0 01 60 BD 80 85
0DB9:19 48 BD 80 1A 48 BD 80 20
0DC1:1B 48 A5 B5 C9 03 D0 0C 93
0DC9:A9 C7 38 FD 80 19 9D 80 B5
0DD1:19 20 1D 0E A5 B5 29 02 5D
0DD9:F0 15 A9 27 38 FD 80 1A 2E
0DE1:9D 80 1A A9 07 38 FD 80 5E
0DE9:1B 9D 80 1B 20 1D 0E A5 F1
0DF1:B5 29 01 F0 0C A9 C7 38 2F
0DF9:FD 80 19 9D 80 19 20 1D F5
0E01:0E 68 9D 80 1B 68 9D 80 30
0E09:1A 68 9D 80 19 60 20 37 C9
0E11:0E A8 B9 4C 11 A0 00 31 96
0E19:FB 91 FB 60 20 37 0E 18 2F
0E21:7D C5 15 85 02 A0 00 B1 AC
0E29:FB A4 02 39 4C 11 19 34 4D
0E31:11 A0 00 91 FB 60 BD 80 74
0E39:19 A8 B9 A0 17 85 FB B9 CD
0E41:68 18 85 FC BD 80 1A A8 E4
0E49:B9 30 19 18 65 FB 85 FB 15
0E51:B9 58 19 65 FC 85 FC BD 8F
0E59:80 1B 60 BD 80 1C 49 FF 6B
0E61:18 69 01 9D 80 1C 60 BD D0
0E69:80 1D 49 FF 18 69 01 9D 3C
0E71:80 1D 60 BD 80 1C C9 0A 0F
0E79:F0 30 18 69 01 9D 80 1C 4F
0E81:60 BD 80 1C C9 F6 F0 22 3D
0E89:38 E9 01 9D 80 1C 60 BD 29
0E91:80 1D C9 08 F0 14 18 69 60
0E99:01 9D 80 1D 60 BD 80 1D 97
0EA1:C9 F8 F0 06 38 E9 01 9D 68
0EA9:80 1D 60 BD 80 1C C9 02 3F
0EB1:90 10 C9 FF B0 0C A8 10 6A
0EB9:06 20 74 0E 4C C3 0E 20 FD
0EC1:82 0E BD 80 1D C9 02 90 07
0EC9:08 C9 FF B0 04 10 CE 30 95
0ED1:BE 68 68 4C DE 09 C9 02 E9
0ED9:F0 06 20 21 0F 4C F5 0E A9
0EE1:A4 B6 F0 10 A9 C7 9D 80 45
0EE9:19 A9 27 9D 80 1A A9 80 FB
0EF1:9D 80 1C 60 AD C6 16 9D D8
0EF9:80 19 AD C7 16 9D 80 1A 11
0F01:AD C8 16 9D 80 1B 4C 84 52
0F09:0F A9 20 85 FC AA A9 00 5B
0F11:85 FB A8 91 FB C8 D0 FB BF
0F19:E6 FC E8 E0 40 D0 F4 60 A4
0F21:AD 1B D4 C5 9F B0 F9 65 EC
0F29:B2 8D C6 16 AD 1B D4 29 EA
0F31:3F C5 9E B0 F7 65 B1 8D 85
0F39:C7 16 AD 1B D4 29 07 8D 0F
0F41:C8 16 60 A9 FF 9D 80 1E 85
0F49:60 A5 AA F0 07 E4 BF 90 41
0F51:F2 4C 92 0C A5 A7 F0 06 C2
0F59:AD C5 16 4C 6B 0F AD 1B 55
0F61:D4 29 03 C9 03 F0 F7 0A 07
0F69:0A 0A 9D C5 15 A5 A9 F0 A2
0F71:03 4C D7 0E A9 64 9D 80 9A
0F79:19 A9 14 9D 80 1A A9 07 B1
0F81:9D 80 1B 20 28 10 4C 47 55
0F89:0D 20 0A 0F A9 93 20 D2 17
0F91:FF A9 0B 8D 11 D0 A9 17 8A
0F99:8D 18 D0 A9 C8 8D 16 D0 B2
0FA1:A9 A6 A0 11 20 1E AB A9 DD
0FA9:D0 A0 11 20 1E AB A9 A6 16
0FB1:A0 11 20 1E AB A9 C0 A0 70
0FB9:12 20 1E AB A9 87 A0 13 27
0FC1:20 1E AB A9 62 A0 14 20 65
0FC9:1E AB A9 3F A0 15 20 1E C2
0FD1:AB A9 20 8D 88 02 A9 00 AC
0FD9:8D CA 16 A9 1B 8D 11 D0 D0
0FE1:A9 00 85 C6 85 A2 A5 C6 BA
0FE9:D0 2E A5 A2 C9 03 90 FA 51
0FF1:A9 00 85 A2 A9 BA A0 15 4E
0FF9:20 1E AB AC CA 16 B9 29 3B
1001:11 8D 86 02 A9 20 20 D2 DE
1009:FF EE CA 16 C8 C0 0B 90 8F
1011:D5 A9 00 8D CA 16 F0 CE BE
1019:A9 04 8D 88 02 A5 91 30 43
1021:01 00 A9 00 85 C6 60 AD AC
1029:1B D4 C5 9B B0 F9 38 E5 42
1031:9C 9D 80 1D D0 07 AD 1B 02
1039:D4 29 03 D0 EA AD 1B D4 94
1041:C5 9B B0 F9 38 E5 9C 9D 11
1049:80 1C D0 07 AD 1B D4 29 E7
1051:03 D0 EA BD 80 1D DD 80 15
1059:1C F0 06 18 7D 80 1C D0 FC
1061:07 AD 1B D4 29 01 F0 BF 10
1069:BD 80 1C 1D 80 1D F0 B7 EF
1071:60 A9 0B 8D 11 D0 20 0A 7C
1079:0F A9 15 8D 18 D0 A9 C8 27
1081:8D 16 D0 A9 64 A0 11 20 8A
1089:1E AB A9 00 A6 AB E8 D0 5F
1091:02 A9 01 20 CD BD A9 8F 87
1099:A0 11 20 1E AB A9 1B 8D FB
10A1:11 D0 A0 00 20 A2 B3 20 A5
10A9:CF FF C9 0D F0 28 C9 30 A7
10B1:90 1A C9 3A B0 16 29 0F BC
10B9:48 20 E2 BA 20 0C BC 68 21
10C1:A8 20 A2 B3 A5 61 20 6A 2B
10C9:B8 4C A8 10 A9 82 A0 11 19
10D1:20 1E AB 4C A3 10 20 AA 0C
10D9:B1 C9 01 90 07 D0 ED 98 5E
10E1:D0 EA F0 04 C0 00 F0 3D A8
10E9:88 84 AB A4 AB C8 A5 B5 B0
10F1:29 01 F0 0B 18 98 D0 01 7B
10F9:38 6A A8 D0 02 A0 01 A5 2D
1101:B5 29 02 F0 0B 18 98 D0 52
1109:01 38 6A A8 D0 02 A0 01 62
1111:A5 AA F0 07 98 0A A8 90 0E
1119:02 A0 00 88 84 BE 98 18 55
1121:69 01 6A 85 BF 4C A0 08 56
1129:0D 05 07 0A 08 09 02 04 01
1131:06 0E 03 01 01 04 04 10 7A
1139:10 40 40 02 02 08 08 20 FB
1141:20 80 80 03 03 0C 0C 30 64
1149:30 C0 C0 FC FC F3 F3 CF 0B
1151:CF 3F 3F FC FC F3 F3 CF 52
1159:CF 3F 3F FC FC F3 F3 CF 5A
1161:CF 3F 3F 93 9F 11 1D 43 1B
1169:55 52 52 45 4E 54 20 4E BB
1171:55 4D 42 45 52 20 4F 46 26
1179:20 53 54 41 52 53 3A 20 93
1181:00 0D 0D 1D 54 52 59 20 19
1189:41 47 41 49 4E 21 0D 0D F8
1191:1D 43 48 41 4E 47 45 20 6A
1199:54 4F 20 28 31 2D 32 35 18
11A1:36 29 3A 20 00 9E 2A 2A 6B
11A9:2A 2A 2A 2A 2A 2A 2A 2A CB
11B1:2A 2A 2A 2A 2A 2A 2A 2A D3
11B9:2A 2A 2A 2A 2A 2A 2A 2A DB
11C1:2A 2A 2A 2A 2A 2A 2A 2A E3
11C9:2A 2A 2A 2A 2A 2A 00 2A 97
11D1:9F 20 9A 20 1F 20 9C 20 F3
11D9:1C 20 95 20 81 20 96 20 A0
11E1:9E 20 1E 20 99 D3 9F D4 51
11E9:9A C1 1F D2 9C C2 1C D5 D8
11F1:95 D2 81 D3 96 D4 9E 20 66
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1581 PATH

Randy Dethman

With this short machine language routine for the 64, you can access 1581 partitions as easily as you would a subdirectory on an MS-DOS machine.

When Commodore introduced the 1581 disk drive, it claimed that the drive supported subdirectories through a mechanism called partitions. What the company didn't say was that the commands necessary to access these partitions were often so cumbersome as to be impractical.

1581 Path lets you use pathnames to access partitions as if they were true subdirectories (similar to those on MS-DOS and Apple computers). So now, for instance, instead of having to use unwieldy commands like OPEN15,9,15,"/0:FRED":CLOSE15:LOAD"$",9 to examine the contents of the partition FRED, you can employ the more intuitive command LOAD"/FRED/$",9.

Getting Started

Since *1581 Path* is written in machine language, you'll need to enter it using *MLX*, the machine language entry program found elsewhere in this issue. The *MLX* prompts, and the values you should enter, are as follows:

Starting address: 031A
Ending address: 0401

When you've finished typing, be sure to save a copy of the program before exiting *MLX*.

1581 Path wedges itself into the system by directly overwriting the page3 vector for the 64's Kernal OPEN routine. To activate *1581 Path*, simply type LOAD"*filename*",*device*,1, where *filename* is the name you used when you saved the program from *MLX* and *device* is the number of the disk drive. After the program loads, the wedge is active; you don't need a SYS or RUN command to execute it. To deactivate it, simply press RUN/STOP–RESTORE.

Pathnames

1581 Path simulates actual hierarchical subdirectories by allowing you to include partition names along with filenames. The name of a file, plus the partition names needed to locate the file on the disk, is referred to as the pathname for the file.

You can substitute a pathname for a filename in any BASIC command. Commands using pathnames can be entered from direct mode or from program mode and can even be used from within other programs that prompt you for a filename. However, you can't use pathnames with DOS commands such as SCRATCH or COPY (for example, PRINT#1,"S0:filename" or OPEN15,8,15,"C0:newname=oldname"). For these commands, you'll have to rely on the standard DOS partition commands described in the *1581 Disk Drive User's Guide*.

1581 Path's syntax for pathnames is similar to that used with MS-DOS or Apple's ProDOS.

/partitionname/ . . . /filename

The root directory of a disk is indicated by a null partition name (//). Other partition names are always preceded by a slash (/) and may be nested to any depth. If you don't include the root directory as part of the pathname, the 1581 begins the path from the current partition (as usual). Some commands demonstrating valid pathnames follow.

```
LOAD"/MYDIR/MYFILE",8
LOAD"//SOURCE/ASSEMBLER/
  ARC04.ASM",8
```

In the first example, the file MYFILE in the partition MYDIR is loaded. Here, it's assumed that the partition MYDIR is in the current directory (or partition); if it's not, a FILE NOT FOUND error will be returned. In the second example, the full path to the file, starting from the root directory of the disk, is specified. This ensures that the command will succeed regardless of the current directory.

To access a file whose name already begins with a slash, add 0: to the beginning of the filename. For example, you'd refer to the file /FILE as 0:/FILE.

1581 Path supports standard Commodore wildcards within pathnames. For instance, the pathname //MYD*/DIR*/?FILE would cause the 1581 to search the root directory of a disk for a partition that matches MYD*. If one is found, it searches within that partition for another partition matching DIR*. Finally, if it finds a match for the first two wildcards, it looks for a file that matches ?FILE.

To Err Is Human

Attempting a load from an invalid path results in a "?FILE NOT FOUND" error. This message will be followed by the link in the path that caused the problem. Saving to an invalid path will

1581 Path

return a similar error message but will not show the location of the error. Using an invalid path in an OPEN command passes the invalid path to the disk drive. This causes the drive to return the message 62 FILE NOT FOUND on the error channel. In all cases, the new current directory is the last one successfully selected along the attempted path.

If you try to access a filename that ends with a slash, the LOAD and SAVE commands will return ?MISSING FILENAME ERROR. The same syntax with an OPEN command passes a null filename to the disk drive. Because opening files without a filename is legal, no error will be generated. If you use a pathname with only one slash at the beginning, the slash is simply discarded. (A valid partition name requires at least two slashes, one before and one after the partition name.)

If you attempt to use pathnames on disk drives that aren't capable of using partitions (1541 or 1571), the drive will return error messages indicating that those partitions or files don't exist (which they don't).

Beware of programs that automatically append 0: to the beginning of filenames. *1581 Path* can't catch these, and the disk drive will try to open a file using your entire pathname as the filename (0:/MYDIR/MYFILE, for example).

How It Works

1581 Path loads over the top of the IOPEN vector at $31A (794) and uses all of the memory normally reserved for the cassette buffer. It doesn't use any memory outside of this area. If you're using any other program that alters the IOPEN vector, load *1581 Path* first because it doesn't check or save the original vector values.

The program intercepts all filenames that go through the Kernal OPEN routine, including BASIC's LOAD, SAVE, and OPEN commands, and calls to the Kernal from machine language. It splits the pathname into separate partition commands for each step in the path and then passes the remaining filename to the Kernal routine that was originally called.

1581 Path won't intercept calls to a device number less than 8 or with a secondary address of 15 (the disk drive's command channel). This allows commands sent to disk drives and other peripherals to remain unchanged. The program also doesn't intercept pathnames that don't begin with a slash, so existing filenames are still valid.

A final word of warning about OPEN statements: The 1581 drive won't allow you to open two logical files in separate partitions at the same time. Be sure that all files opened simultaneously are in the same partition, and select the partition only in the first OPEN statement. If your program uses only one file at a time, you may select a new partition with each OPEN statement as long as the previous file has been properly closed.

1581 Path

```
031A:49 03 91 F2 0E F2 50 F2 B6
0322:33 F3 57 F1 CA F1 ED F6 B9
032A:3E F1 2F F3 66 FE 43 03 A9
0332:34 03 20 5B 03 09 00 F0 F9
033A:03 4C ED F5 A2 04 6C 00 EF
0342:03 20 5B 03 4C A5 F4 20 70
034A:4F 03 4C 4A F3 08 48 8A C1
0352:48 98 48 A5 B8 48 4C 6B F0
035A:03 08 48 8A 48 98 48 A5 70
0362:B8 48 20 E7 FF A9 0F 85 A3
036A:B8 A5 B9 48 A5 BA C9 08 A5
0372:90 0E A5 B9 C9 0F F0 08 09
037A:A2 00 A1 BB C9 2F F0 03 B1
0382:4C F3 03 A9 0F 85 B9 A0 49
038A:00 C8 98 C5 B7 90 03 4C 84
0392:EB 03 B1 BB C9 2F D0 F1 DF
039A:A5 B7 48 84 B7 20 4A F3 79
03A2:90 08 C9 02 D0 0A 68 4C 18
03AA:F3 03 20 B7 FF AA F0 0B 82
03B2:20 E2 03 BA A9 00 9D 06 1C
03BA:01 F0 EB A6 B8 20 C6 FF 39
03C2:20 CF FF C9 30 D0 E9 20 22
03CA:E2 03 A5 B7 18 65 BB 85 86
03D2:BB A5 BC 69 00 85 BC 68 46
03DA:38 E5 B7 85 B7 4C 89 03 CA
03E2:20 CC FF A5 B8 20 C3 FF 54
03EA:60 C6 B7 E6 BB D0 02 E6 44
03F2:BC 68 85 B9 68 85 B8 68 F0
03FA:A8 68 AA 68 28 60 00 00 0E
```

G

Starburst Graphics

```
11F9:1E C7 99 D2 9F C1 9A D0 87
1201:1F C8 9C C9 1C C3 95 D3 06
1209:20 20 20 20 20 20 20 20 2D
1211:20 20 9E 2A 2A 20 20 20 F5
1219:20 20 20 20 20 20 20 20 3D
1221:20 95 C2 59 20 C2 4F 42 95
1229:20 CD 41 53 54 45 52 53 DD
1231:20 20 20 20 20 20 20 20 55
1239:20 20 20 20 9E 2A 2A 20 8D
1241:20 20 20 20 1F 28 C3 29 CD
1249:20 31 39 39 30 20 C3 4F 5D
1251:4D 50 55 54 45 21 20 D0 DF
1259:55 42 2E 2C 20 C9 4E 43 49
1261:2E 20 20 20 20 20 9E 2A 93
1269:2A 20 20 20 20 20 20 20 92
1271:20 20 1F C1 4C 4C 20 52 D3
1279:49 47 48 54 53 20 52 45 67
1281:53 45 52 56 45 44 2E 20 08
1289:20 20 20 20 20 20 20 20 AD
1291:9E 2A 2A 20 20 20 20 20 B8
1299:20 20 96 12 28 D0 52 45 38
12A1:53 53 20 41 4E 59 20 4B BF
12A9:45 59 20 54 4F 20 42 45 D4
12B1:47 49 4E 29 92 20 20 20 9D
12B9:20 20 20 20 9E 2A 00 81 1B
12C1:12 20 D8 20 92 20 CD 49 0E
12C9:52 52 4F 52 20 48 4F 52 CD
12D1:49 5A 4F 4E 54 41 4C 4C 8C
12D9:59 9A 12 20 CD 20 92 20 C9
12E1:D4 48 49 53 20 4D 45 4E EF
12E9:55 0D 81 12 20 D9 20 92 88
12F1:20 CD 49 52 52 4F 52 20 7C
12F9:56 45 52 54 49 43 41 4C 50
1301:4C 59 20 20 9E 12 20 CF F6
1309:20 92 20 CF 43 45 41 4E E4
1311:0D 12 20 C2 20 92 20 C2 C0
1319:4F 55 4E 43 45 20 20 20 45
1321:20 20 20 20 20 20 20 20 47
1329:20 20 12 20 C6 20 92 20 A7
1331:C6 4F 55 4E 54 41 49 4E A6
1339:0D 12 20 CA 20 92 20 CA 71
1341:55 4D 50 20 42 41 43 4B 5A
1349:20 20 20 20 20 20 20 20 6F
1351:20 20 12 20 D3 20 92 20 38
1359:D3 50 49 52 41 4C 0D 9F C0
1361:12 31 2D 39 92 20 D4 41 16
1369:49 4C 20 4C 45 4E 47 54 56
1371:48 20 20 20 20 20 20 20 AB
1379:20 9E 12 20 C1 20 92 20 6F
1381:C1 54 4F 4D 0D 00 9F 12 16
1389:30 2F D4 92 20 D4 55 52 A8
1391:4E 20 4F 46 46 20 54 41 D1
1399:49 4C 53 20 20 20 1E 12 B3
13A1:D3 50 41 43 45 92 20 C3 9A
13A9:4C 45 41 52 20 53 43 52 BB
13B1:45 45 4E 0D 9F 12 20 C3 AF
13B9:20 92 20 C3 4F 4E 54 49 7A
13C1:4E 55 4F 55 53 20 44 52 99
13C9:41 57 49 4E 47 20 20 20 8F
13D1:20 20 1E 41 4E 44 20 52 FD
13D9:45 53 54 41 52 54 0D 9C B0
13E1:12 20 CE 20 92 20 CE 55 FC
13E9:4D 42 45 52 20 4F 46 20 FF
13F1:53 54 41 52 53 20 20 20 9F
13F9:20 20 20 20 20 1E 41 4C 86
1401:4C 20 53 54 41 52 53 0D 0E
1409:12 20 D5 20 92 20 D5 4E 0E
1411:49 43 4F 4C 4F 52 20 42 A3
1419:55 52 53 54 53 20 20 20 AB
1421:12 C8 CF CD C5 92 20 C3 D7
1429:4C 45 41 52 20 53 43 52 3D
1431:45 45 4E 0D 81 12 46 31 F9
1439:2D 46 35 92 20 C3 48 41 3B
1441:4E 47 45 20 43 4F 4C 4F 4C
1449:52 53 20 20 20 20 20 20 57
1451:20 20 1E 42 55 54 20 43 F8
1459:4F 4E 54 49 4E 55 45 0D 3B
1461:00 81 12 20 46 37 92 20 82
1469:D2 45 53 45 54 20 41 4C FC
1471:4C 20 43 4F 4C 4F 52 53 BC
1479:20 20 20 20 20 20 20 1E 9F
1481:53 54 41 52 53 20 57 48 C7
1489:45 52 45 0D 9A 12 20 C4 84
1491:20 92 20 C4 45 46 41 55 D9
1499:4C 54 53 20 52 45 53 54 0C
14A1:4F 52 45 44 20 20 20 20 D4
14A9:20 20 1E 54 48 45 59 20 1D
14B1:4C 45 46 54 20 4F 46 46 70
14B9:9E 12 20 C8 20 92 20 C8 9A
14C1:45 49 47 48 54 20 4F 46 54
14C9:20 53 43 52 45 45 4E 20 60
14D1:20 20 9A 12 20 D2 20 92 A5
14D9:20 D2 41 4E 44 4F 4D 20 ED
14E1:4D 4F 56 45 53 0D 9E 12 C1
14E9:20 D7 20 92 20 D7 49 44 7C
14F1:54 48 20 4F 46 20 53 43 EB
14F9:52 45 45 4E 20 20 20 20 0C
1501:81 12 20 D6 20 92 20 D6 44
1509:45 4C 4F 43 49 54 59 0D 62
1511:98 12 20 D1 20 92 20 D2 8B
1519:41 4E 44 4F 4D 20 53 54 DA
1521:41 52 54 20 46 4F 52 20 41
1529:20 20 81 12 20 D0 20 92 D3
1531:20 D3 50 45 45 44 20 4C 86
1539:49 4D 49 54 0D 00 20 20 92
1541:20 20 98 57 48 4F 4C 45 69
1549:20 42 55 52 53 54 20 20 30
1551:20 20 20 20 9C 12 D3 C8 37
1559:C9 C6 D4 92 20 D0 41 55 F9
1561:53 45 0D 98 12 20 DA 20 98
1569:92 20 D2 41 4E 44 4F 4D C2
1571:20 53 54 41 52 54 20 46 89
1579:4F 52 20 20 20 9E 12 20 A5
1581:CC 20 92 20 CC 49 4D 49 DD
1589:54 45 44 20 4C 49 46 45 13
1591:0D 98 20 20 20 20 45 41 BB
1599:43 48 20 53 54 41 52 20 1D
15A1:20 20 20 20 9A 12 D2 D5 82
15A9:CE 2F D3 D4 CF D0 92 20 D5
15B1:C5 58 49 54 13 9E 2A 9D 48
15B9:00 13 11 11 9E 14 14 13 5C
15C1:11 1D 94 00 00 00 00 00 4E
```

G

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PLAYFIELDS

EDITOR'S CHOICE

Richard Penn

When it comes to computer graphics, nothing is more impressive than full-screen animation. Unfortunately, animation on the 64 is generally done using sprites—objects which are small in comparison to the overall screen size.

Playfields offers an alternative based on the Amiga's dual-playfield video mode. This utility lets you animate large screen areas by using two independent *playfields:* the overlay field and the text field. These fields can be placed over one another and be scrolled smoothly in various directions for exciting 3-D layering effects. Overlay panels can pass smoothly in front of or behind the text screen. Screens can also have transparent portions, so when one screen is moving over another, the screen behind is visible through the first.

But that's not all. There's also an overscan mode, where the overlay extends into the screen's border. Overlays can be rolled in one place for animated backdrops, and the text screen can be waved and wiped. A demo which illustrates all these features, plus a few extras, is included.

Think there's nothing new for the 64? Then take a look at this nifty animation package. It lets you simulate a layering technique formerly available only to Amiga users.

Getting Started

Playfields consists of three programs. The first is the actual machine language playfield routine. To enter this program, you'll need to use *MLX*, the machine language entry program located elsewhere in this issue. The *MLX* prompts, and the values you should enter, are given below.

Starting address: C000
Ending address: C61F

When you've finished typing, be sure to save the program to disk as PLAYFIELDS.OBJ before exiting *MLX*.

The second program is a binary file containing sprite definitions used by *Playfields*. Again, you'll need *MLX* to type in this program. When *MLX* prompts you, respond with the following values:

Starting address: 3E40
Ending address: 3FFF

When you've finished typing, save this file to the disk containing PLAYSPRITES.

The third program is a BASIC program that shows how to use *Playfields*. To avoid typing mistakes, enter this program using *The Automatic Proofreader*, also located elsewhere in this issue. When you've finished typing, save a copy of the program to the disk with PLAYFIELDS.OBJ and PLAYSPRITES.

To use *Playfields* in your own programs, add lines 20–80 of the demo to the beginning of your program.

Playfield Commands

Playfields was designed to be powerful yet simple to use. The basis of the program is the overlay—a simulated hi-res

screen composed of sprites. For most applications, hi-res is a lot of trouble, requiring a good deal of memory and lengthy load times. Also, it's often tedious to draw large graphic areas.

For these reasons, *Playfields* uses a single sprite as a tile pattern for the entire overlay. And, since three overlays are included with the program, you don't have to spend time drawing your own. You just use the ones provided, and with a few commands, you'll have great results.

To access *Playfields'* features, use the SYS commands described in the following paragraphs. These commands are available from direct mode or from within a BASIC program.

SYS 49854,*block,X-expansion,Y-expansion,multicolor,color1,color2,color3* This command, which must be called before any others, activates *Playfields*. It designates the memory location of the sprite block (0–255) used for the overlay pattern, sets the sprite X- and Y-expansion parameters (0 = off, 255 = on), selects multicolor mode (0 = off, 255 = on), and determines the three overlay colors (0–15). If multicolor isn't used, only the last color value is significant.

As mentioned earlier, three overlay patterns are included. To use them in your own programs, specify one of the commands from the following table.

Pattern	Command
Granite	SYS 49854,255,255,255,255,15,11,12
Grating	SYS 49854,254,255,255,255,15,11,12
Bars	SYS 49854,253,0,255,255,15,11,12

SYS 49931 Determines the overlay priority. Specifically, it toggles the overlay so that it appears either behind or in front of the text screen. By default, whenever *Playfields* is activated, the overlay is displayed over the text screen.

If you cover the text screen with a solid overlay, you can print to the screen and then instantaneously make the text appear so that the user sees only the completed screen. But there are better ways to introduce new screens. More on this later.

SYS 49940,*speed* Sets the overlay scroll speed to either 0 or 1, where 0 is fast and 1 is slow.

SYS 49969,*mode* Selects overscan mode. Normally, graphics can be displayed only within the confines of the border. This command enables you to extend the height of the overlay to the vertical edges of the screen.

There are three overscan modes: overscan off (0), which turns off overscan; partial overscan (1), which extends the overlay partially over the border; and full overscan (2), which extends it completely over the border. Note that in full overscan, an overlay can only be scrolled slowly; otherwise, the screen will be distorted.

SYS 49643,*direction* Scrolls the overlay panel. The direction parameter can be any value in the range 0–5. A direction of 0 scrolls a panel across the screen from left to right. Direction 1 wipes a panel on the screen from the left and stops when the panel is completely on the screen. Direction 2 scrolls a panel that's on the screen off the right edge. Values 3–5 perform the same respective functions as 0–2, but in the opposite directions.

SYS 49791,*direction* Handles the stationary scroll. This command scrolls an overlay right (*direction* = 0) or left (*direction* = 1) without actually moving it off the screen. This effect is similar to moving while looking out a window at a wall. To exit the effect, hold down the space bar until the program recognizes that it's being pressed; then release it.

SYS 50028 Produces a playfield wave effect over the text screen. For this command to work, you must have a visible overlay onscreen. To exit the effect, press the space bar as in the previous command.

SYS 50564,*direction* This command causes a playfield wipe. That is, it quickly scrolls the contents of the text screen off either to the left (*direction* = 0) or the right (*direction* = 1). Note that all the characters on the screen must be the same color since this command changes everything to the current cursor color. Also, the top row, as well as the far left and far right columns, cannot be used.

SYS 50621 This command turns off *Playfields*.

Additional Tricks

It isn't necessary to scroll an overlay onscreen before you move it off the screen. Scroll commands will make it appear instantly, whether it was there before or not. For example, if the screen is blank and you call the stationary scroll command, the entire moving overlay will instantly appear.

The priority command lets you toggle the text screen on and off while the overlay is visible. To blank the entire display, including the overlay, make the screen the same color as the border and then enter POKE 49237,11. To make it reappear, use the overscan command (SYS 49969,*mode*).

The vertical position of the overlay in full overscan mode can be shifted by POKEing location 49242 with values in the range 25–32. You must always return the overlay to position 27 (either by POKEing or by using the overscan command) when you've finished for the playfield wave command (SYS 50028) to work properly.

Because the overlay is made up of sprites, location 53271 (Y-expansion) can be POKEd to change the tile size of any or all of the sprite bars.

Combining Video Effects

With *Playfields*, you're no longer limited to moving small sprites. Instead, you can smoothly slide entire screens over one another. Animation effects like backdrops and video wipes are easy to pull off. To realize the full potential of *Playfields*, you'll need to experiment with its many options. You'll soon learn that the real power of *Playfields* comes from combining various effects in succession.

PLAYFIELDS.OBJ

```
C000:78 A9 7F 8D 0D DC A9 01 21
C008:8D 1A D0 A9 00 8D FF 3F 01
C010:A9 1B 8D 11 D0 A9 21 8D EC
C018:14 03 A9 C0 8D 15 03 58 C4
C020:60 A9 01 8D 19 D0 A5 02 8E
C028:18 69 04 A2 10 9D FF CF 81
C030:CA CA D0 F9 A5 02 18 69 52
C038:15 C9 0A 90 0B 8D 12 D0 84
C040:85 02 68 A8 68 AA 68 40 9B
C048:A2 1B 8E 11 D0 AE 12 D0 FA
C050:E0 FA D0 F9 A2 13 8E 11 4A
C058:D0 A9 1B 8D 12 D0 85 02 C9
C060:AD 2D C6 D0 DD 4C 31 EA 57
C068:A2 E3 8E 00 D0 A2 13 8E CB
C070:02 D0 A2 43 8E 04 D0 A2 78
C078:73 8E 06 D0 A2 A3 8E 08 ED
C080:D0 A2 D3 8E 0A D0 A2 03 52
C088:8E 0C D0 A2 33 8E 0E D0 59
C090:A2 C1 8E 10 D0 8E 2C C6 86
C098:A2 80 D0 00 EA 8E 15 D0 32
C0A0:A2 10 BD FE CF 9D 1B C6 11
C0A8:CA CA D0 F6 A0 30 EE 1D 8C
C0B0:C6 EE 1F C6 EE 21 C6 EE 1A
C0B8:23 C6 EE 25 C6 EE 27 C6 B4
C0C0:EE 29 C6 EE 2B C6 AD 1D B8
C0C8:C6 C9 00 D0 05 A2 C0 8E EF
C0D0:2C C6 C9 10 D0 05 A2 E0 15
C0D8:8E 2C C6 A2 10 AD 12 D0 DB
C0E0:C9 0B D0 F9 AD 12 D0 C9 E4
C0E8:12 90 F9 BD 1B C6 9D FE E0
C0F0:CF CA CA D0 F6 AD 2C C6 01
C0F8:8D 10 D0 88 D0 B0 60 A9 9B
C100:01 8D 99 C0 20 68 C0 A9 74
C108:03 8D 99 C0 20 68 C0 A9 7D
C110:07 8D 99 C0 20 68 C0 A9 87
C118:0F 8D 99 C0 20 68 C0 A9 93
C120:1F 8D 99 C0 20 68 C0 A9 A3
C128:3F 8D 99 C0 20 68 C0 A9 BB
C130:7F 8D 99 C0 20 68 C0 A9 E3
C138:FE 8D 99 C0 20 68 C0 A9 AB
C140:FC 8D 99 C0 20 68 C0 A9 B2
C148:F8 8D 99 C0 20 68 C0 A9 B8
C150:F0 8D 99 C0 20 68 C0 A9 BC
C158:E0 8D 99 C0 20 68 C0 A9 BC
C160:C0 8D 99 C0 20 68 C0 A9 B4
C168:80 8D 99 C0 20 68 C0 A9 9C
C170:00 8D 2D C6 60 AD 12 D0 18
C178:C9 0B D0 F9 AD 12 D0 C9 7E
C180:12 90 F9 A9 01 8D 2D C6 6A
C188:AD 2E C6 F0 03 4C 37 C1 CF
C190:4C FF C0 A0 09 A2 00 B9 E8
C198:E4 C5 9D 69 C0 E8 E8 E8 AE
C1A0:E8 E8 88 D0 F2 A9 EE A2 AF
C1A8:18 9D AB C0 CA CA CA D0 09
C1B0:F8 A2 00 BD EE C5 8D 91 70
C1B8:C0 E8 BD EE C5 8D 99 C0 D5
C1C0:E8 BD EE C5 8D CA C0 E8 64
C1C8:BD EE C5 8D D3 C0 E8 BD A9
C1D0:EE C5 8D D7 C0 A0 0E A2 B3
C1D8:00 B9 F2 C5 9D 00 C1 E8 DE
C1E0:E8 E8 E8 E8 E8 E8 E8 88 04
C1E8:D0 EF 60 20 9B B7 E0 03 5F
```

```
C1F0:B0 21 A9 E4 8D 98 C1 A9 94
C1F8:C5 8D 99 C1 A9 EE 8D A6 DC
C200:C1 A9 00 8D B2 C1 A9 F2 8C
C208:8D DA C1 A9 C5 8D DB C1 BB
C210:4C 34 C2 CA CA CA A9 00 A2
C218:8D 98 C1 A9 C6 8D 99 C1 BE
C220:A9 CE 8D A6 C1 A9 1C 8D C4
C228:B2 C1 A9 0E 8D DA C1 A9 92
C230:C6 8D DB C1 E0 01 F0 17 18
C238:E0 02 F0 2D 8E 2E C6 20 7A
C240:93 C1 A9 A9 8D 37 C1 A9 46
C248:8D 8D 39 C1 4C 75 C1 A9 A0
C250:00 8D 2E C6 20 93 C1 A9 E7
C258:4C 8D 37 C1 A9 6F 8D 38 C8
C260:C1 A9 C1 8D 39 C1 4C 75 21
C268:C1 A9 01 8D 2E C6 20 93 92
C270:C1 A9 A9 8D 37 C1 A9 8D F0
C278:8D 39 C1 4C 75 C1 EA 20 B8
C280:9B B7 E0 00 F0 02 E8 E8 28
C288:E8 A9 60 8D 66 C2 20 EE 3F
C290:C1 A9 4C 8D 66 C2 AD 12 6F
C298:D0 C9 0B D0 F9 AD 12 D0 E2
C2A0:C9 12 90 F9 A9 01 8D 2D DA
C2A8:C6 A9 FF 8D 99 C0 20 68 4D
C2B0:C0 AD 01 DC C9 EF D0 F6 96
C2B8:A9 00 8D 2D C6 60 20 F1 81
C2C0:B7 8A A2 08 9D F7 07 CA 3F
C2C8:D0 FA 20 F1 B7 8E 1D D0 9B
C2D0:20 F1 B7 8E 17 D0 20 F1 F0
C2D8:B7 8E 1C D0 20 F1 B7 8E 35
C2E0:25 D0 20 F1 B7 8E 26 D0 65
C2E8:20 F1 B7 8A A2 08 9D 26 31
C2F0:D0 CA D0 FA A9 32 A2 10 C6
C2F8:9D FF CF CA CA D0 F9 A9 2B
C300:00 8D 1B D0 8D 2D C6 20 2A
C308:00 C0 60 AD 1B D0 49 FF 55
C310:8D 1B D0 60 20 F1 B7 E0 5E
C318:00 F0 0B A9 0B 8D E1 C0 EA
C320:A9 12 8D E8 C0 60 A9 06 22
C328:8D E1 C0 A9 00 8D E8 C0 6A
C330:60 20 F1 B7 E0 00 F0 24 B6
C338:E0 01 F0 10 A9 13 8D 55 99
C340:C0 A9 1B 8D 5A C0 A9 00 F7
C348:8D FF 3F 60 A9 13 8D 55 8E
C350:C0 A9 2E 8D 5A C0 A9 00 6A
C358:8D FF 3F 60 A9 1B 8D 55 BE
C360:C0 A9 1B 8D 5A C0 A9 FF 18
C368:8D FF 3F 60 AD 11 D0 10 08
C370:FB A9 01 8D 2D C6 A9 C8 F9
C378:8D 16 D0 AD 15 D0 8D 2F 77
C380:C6 A9 FF 8D 15 D0 EE 16 8E
C388:D0 20 B3 C3 AD 16 D0 C9 64
C390:CF D0 F3 CE 16 D0 20 B3 87
C398:C3 AD 16 D0 C9 C8 D0 F3 44
C3A0:AD 01 DC C9 EF D0 DF A9 A3
C3A8:00 8D 2D C6 AD 2F C6 8D EA
C3B0:15 D0 60 A0 1A 88 EA D0 A6
C3B8:FC 60 A9 01 8D 2D C6 A0 6B
C3C0:28 AD 11 D0 10 FB A9 CF 8A
C3C8:8D 16 D0 AD 11 D0 10 FB 79
C3D0:CE 16 D0 20 7E C5 AD 16 DD
C3D8:D0 C9 C8 D0 EE AD 11 D0 82
C3E0:10 FB A2 01 BD 28 04 9D 08
C3E8:27 04 BD 50 04 9D 4F 04 FA
C3F0:BD 78 04 9D 77 04 BD A0 B7
C3F8:04 9D 9F 04 BD C8 04 9D D4
C400:C7 04 BD F0 04 9D EF 04 AF
C408:BD 18 05 9D 17 05 BD 40 79
C410:05 9D 3F 05 BD 68 05 9D F2
C418:67 05 BD 90 05 9D 8F 05 1A
C420:BD B8 05 9D B7 05 BD E0 5F
C428:05 9D DF 05 BD 08 06 9D 9F
C430:07 06 BD 30 06 9D 2F 06 84
C438:BD 58 06 9D 57 06 BD 80 20
C440:06 9D 7F 06 BD A8 06 9D BE
C448:A7 06 BD D0 06 9D CF 06 38
C450:BD F8 06 9D F7 06 BD 20 05
C458:07 9D 1F 07 BD 48 07 9D DB
C460:47 07 BD 70 07 9D 6F 07 A2
C468:BD 98 07 9D 97 07 BD C0 C6
C470:07 9D BF 07 E8 E0 28 F0 59
C478:03 4C E4 C3 A9 CF 8D 16 2D
C480:D0 88 F0 03 4C CB C3 AD A9
C488:11 D0 10 FB A9 C8 8D 16 32
C490:D0 A9 93 20 D2 FF A9 00 4B
C498:8D 2D C6 60 A9 01 8D 2D AC
C4A0:C6 A0 28 AD 11 D0 10 FB 7D
C4A8:A9 C8 8D 16 D0 AD 11 D0 7C
C4B0:10 FB EE 16 D0 20 7E C5 4A
C4B8:AD 16 D0 C9 CF D0 EE AD A2
C4C0:11 D0 10 FB A2 27 BD 27 1D
C4C8:04 9D 28 04 BD 4F 04 9D D1
C4D0:50 04 BD 77 04 9D 78 04 3E
C4D8:BD 9F 04 9D A0 04 BD C7 DB
C4E0:04 9D C8 04 BD EF 04 9D 80
C4E8:F0 04 BD 17 05 9D 18 05 E8
C4F0:BD 3F 05 9D 40 05 BD 67 9C
C4F8:05 9D 68 05 BD 8F 05 9D 9D
C500:90 05 BD B7 05 9D B8 05 5D
C508:BD DF 05 9D E0 05 BD 07 82
C510:06 9D 08 06 BD 2F 06 9D BB
C518:30 06 BD 57 06 9D 58 06 C7
C520:BD 7F 06 9D 80 06 BD A7 44
C528:06 9D A8 06 BD CF 06 9D 6A
C530:D0 06 BD F7 06 9D F8 06 7B
C538:BD 1F 07 9D 20 07 BD 47 05
C540:07 9D 48 07 BD 6F 07 9D 87
C548:70 07 BD 97 07 9D 98 07 E5
C550:BD BF 07 9D C0 07 CA E0 FD
C558:00 F0 03 4C C6 C4 A9 C8 AA
C560:8D 16 D0 88 F0 03 4C AD B4
C568:C4 AD 11 D0 10 FB A9 C8 7D
C570:8D 16 D0 A9 93 20 D2 FF BF
C578:A9 00 8D 2D C6 60 A2 02 5C
C580:CA D0 FD 60 AD 86 02 A0 97
C588:FB 99 FF D7 99 F9 D8 99 F5
C590:F3 D9 99 ED DA 88 D0 F1 2B
C598:AD 15 D0 C9 FF D0 11 AD 0A
C5A0:10 D0 C9 C1 F0 05 A9 7F 2C
C5A8:4C AD C5 A9 FE 8D 15 D0 42
C5B0:20 9B B7 E0 00 F0 03 4C 4E
C5B8:BA C3 4C 9C C4 AD 12 D0 B7
C5C0:C9 26 D0 F9 78 A9 00 8D 6C
C5C8:15 D0 A9 31 8D 14 03 A9 C7
C5D0:EA 8D 15 03 A9 F0 8D 1A 4E
C5D8:D0 A9 81 8D 0D DC A9 1B 8A
C5E0:8D 11 D0 58 60 C1 33 03 8A
C5E8:D3 A3 73 43 13 E3 C1 FF 95
C5F0:00 10 E0 80 C0 E0 F0 F8 09
C5F8:FC FE 7F 3F 1F 0F 07 03 EC
C600:01 E0 63 33 03 D3 A3 73 08
C608:43 13 E0 FF 0F FF C1 01 15
C610:03 07 0F 1F 3F 7F FE FC A7
C618:F8 F0 E0 C0 80 00 00 00 8A
```

PLAYSPRITES

```
3E40:00 08 00 00 02 00 00 00 CE
3E48:80 00 2A 00 00 80 00 00 4C
3E50:80 00 00 20 00 00 08 00 1F
3E58:00 02 00 00 00 80 00 02 59
3E60:00 00 A8 00 02 00 00 02 04
3E68:00 00 00 80 00 00 20 00 2D
3E70:00 20 00 00 20 00 00 80 76
3E78:00 00 20 00 00 08 00 EF 09
3E80:00 20 00 00 08 00 00 08 4D
3E88:00 00 08 00 00 08 00 00 26
3E90:08 00 00 20 00 00 80 00 14
3E98:02 00 00 02 00 00 00 80 B6
3EA0:00 00 20 00 00 08 00 00 41
3EA8:02 00 00 02 00 00 02 00 4A
3EB0:00 00 80 00 00 80 00 02 41
3EB8:00 00 08 00 00 20 00 BF 76
3EC0:00 80 00 00 80 00 00 80 E1
3EC8:00 00 20 00 00 20 00 00 C9
3ED0:20 00 00 08 00 00 08 00 ED
3ED8:00 08 00 00 02 00 00 02 69
3EE0:00 00 02 00 00 A8 00 02 42
3EE8:00 00 00 80 00 00 80 00 6E
3EF0:00 80 00 00 2A 00 00 08 E6
3EF8:00 00 20 00 00 80 00 AF 2B
3F00:00 80 00 00 80 00 00 20 C2
3F08:00 00 08 00 00 08 00 00 A7
3F10:20 00 00 08 00 00 08 00 2F
3F18:00 08 00 00 08 00 00 20 F8
3F20:00 00 80 00 0A 00 00 20 1F
3F28:00 00 08 00 00 02 00 00 AF
3F30:00 80 00 00 20 00 00 80 50
3F38:00 02 00 00 00 80 00 AF E8
3F40:00 27 00 00 27 00 00 27 E8
3F48:00 00 27 00 00 27 00 00 48
3F50:27 00 00 27 00 00 27 00 23
3F58:00 27 00 00 27 00 00 27 01
3F60:00 00 27 00 00 27 00 00 60
3F68:27 00 00 27 00 00 27 00 3B
3F70:00 27 00 00 27 00 00 27 19
3F78:00 00 27 00 00 27 00 00 78
3F80:55 55 55 7F FF F9 70 00 6A
3F88:39 70 00 39 70 00 39 70 B9
3F90:00 39 70 00 39 70 00 39 30
3F98:70 00 39 70 00 39 70 00 43
3FA0:39 70 00 39 70 00 39 70 D1
3FA8:00 39 70 00 39 70 00 39 48
3FB0:70 00 39 70 00 39 7F FF 79
3FB8:F9 6A AA A9 55 55 55 FF 69
3FC0:AA AA AB 95 55 57 95 55 96
3FC8:57 9A AA 97 9A AA B7 9A F1
3FD0:AA B7 9A AA B7 95 AB F7 F3
3FD8:95 AB 57 95 AB 57 95 AB E2
3FE0:57 95 AB 57 95 AB 57 95 FA
3FE8:AB 57 95 AB 57 95 AB 57 40
3FF0:95 AB 57 95 7F 57 95 55 43
3FF8:57 95 55 57 FF FF FF AA 53
```

Demo

```
HQ 10 REM COPYRIGHT 1990 COMPU
      TE! PUBLICATIONS, INC. -
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BB 20 ONAGOTO70,80
SR 30 POKE53280,6:POKE53281,6:
      PRINT"{CLR}":POKE53269,2
      55:FORT=1TO100:NEXT:POKE
      53269,0
HR 40 PRINTTAB(11)"{7}{9 DOWN}
      LOADING PLAYFIELDS"
MD 50 PRINTTAB(11)"{DOWN}ONE M
      OMENT PLEASE..."
QB 60 A=1:LOAD "PLAYFIELDS.OBJ
      ",8,1
SQ 70 A=2:LOAD "PLAYSPRITES",8
      ,1
ED 80 SYS49854,255,255,255,255
      ,15,11,12:SYS50564,1
JD 90 REM GRATING/BARS/FLAG DE
      MO
GH 100 POKE49237,11:POKE53280,
       0:POKE53281,0
SD 110 PRINT"{CLR}{2 DOWN}"TAB
       (11)"{BLU}P L A Y F I E
        L D S{2 DOWN}"
AE 120 FORT=1TO4:PRINTTAB(6)"
       {RVS}{RED}{12 SPACES}
       {WHT} {7}{3 SPACES}
       {WHT} {RED}{12 SPACES}"
       :NEXT
MP 130 PRINTTAB(6)"{RVS}{WHT}
       {13 SPACES}{7}
       {3 SPACES}{WHT}
       {13 SPACES}"
QG 140 PRINTTAB(6)"{RVS}{7}
       {29 SPACES}"
JH 150 PRINTTAB(6)"{RVS}{7}
       {29 SPACES}"
EE 160 PRINTTAB(6)"{RVS}{7}
       {29 SPACES}"
MS 170 PRINTTAB(6)"{RVS}{WHT}
       {13 SPACES}{7}
       {3 SPACES}{WHT}
       {13 SPACES}"
JX 180 FORT=1TO4:PRINTTAB(6)"
       {RVS}{RED}{12 SPACES}
       {WHT} {7}{3 SPACES}
       {WHT} {RED}{12 SPACES}"
       :NEXT
AX 190 PRINTTAB(4)"{2 DOWN}
       {BLU}COPYRIGHT 1990 COM
       PUTE! PUB.,INC."
MC 200 PRINTTAB(11)"ALL RIGHTS
        RESERVED"
FA 210 SYS49854,254,255,255,25
       5,15,11,12:SYS49940,1:S
       YS49969,2
```

```
GK 220 FORT=1TO2
MJ 230 SYS49643,0:SYS49931:SYS
       49643,3:SYS49931:NEXT
DH 240 SYS49940,0:SYS49969,1
HD 250 SYS49931:SYS49643,4:SYS
       49931:SYS49643,2
AX 260 SYS49931:SYS49643,1:SYS
       49931:SYS49643,5
CP 270 SYS49854,253,0,255,255,
       15,11,12:SYS49940,1:SYS
       49969,2
KF 280 SYS49643,4
GM 290 POKE53264,192:SL=164:GO
       SUB650:FORDL=1TO50:NEXT
MB 300 POKE53264,192:SL=21:GOS
       UB650:FORDL=1TO25
SR 310 POKE53264,192:SL=212:GO
       SUB650:FORDL=1TO35
KX 320 SYS49854,253,0,255,255,
       15,11,12
DD 330 SYS49643,2:PRINTTAB(8)"
       {DOWN}{7}PRESS <SPACE>
       {SPACE}TO CONTINUE":SYS
       49791,1
GE 340 SYS49643,2:SYS49854,255
       ,255,255,255,15,11,12:S
       YS49940,0:SYS49969,1
DH 350 SYS49643,1
XG 360 REM GRANITE DEMO
KK 370 PRINT"{BLU}":GOSUB600:S
       YS49643,5:SYS49931:SYS4
       9643,3:SYS49931:SYS4964
       3,0
HC 380 GOSUB640:SYS49940,1:SYS
       49969,2:SYS49931:SYS496
       43,4
GA 390 SYS49791,0:POKE56321,25
       5
AK 400 IFPEEK(56321)<>255THEN4
       00
GJ 410 FORT=26TO25STEP-1:POKE4
       9242,T:NEXT
CG 420 FORT=25TO32:POKE49242,T
       :NEXT:FORT=32TO25STEP-1
       :POKE49242,T:NEXT
PA 430 IFPEEK(56321)<>239THEN4
       20
BX 440 SYS49791,1
CS 450 FORT=1TO2:SYS50564,1:SY
       S49931:GOSUB600:GOSUB64
       0:SYS49931:SYS50564,0
BM 460 SYS49931:GOSUB600:GOSUB
       640:SYS49931:NEXT:SYS50
       564,1
RM 470 SYS49931:PRINT"{7}":GOS
       UB600:GOSUB640
BA 480 SYS49643,5:SYS50564,0:S
       YS49969,2:SYS49643,1
JE 490 REM ANIMATED FLAG DEMO
GR 500 SYS49854,255,255,255,25
       5,15,11,12:SYS49940,1:S
       YS49969,2
ME 510 PRINT"{CLR}{DOWN}"TAB(8
       )"{BLU}P L A Y F I E L
       {SPACE}D{3 SPACES}F L A
        G{DOWN}"
PF 520 FORT=1TO7:PRINTTAB(15)"
       {RVS}{RED} {WHT} {RED}
       {SPACE}{WHT} {RED}
       {WHT} {BLU}{7 SPACES}":
       NEXT
FM 530 FORT=1TO5:PRINTTAB(14)"
       {RVS}{RED} {WHT} {RED}
       {SPACE}{WHT} {RED}
       {WHT} {RED} {WHT} {RED}
        {WHT} {RED} {WHT}
       {RED} ":NEXT
RQ 540 FORT=1TO8:PRINTTAB(13)"
       {RVS}{RED} {WHT} {RED}
       {SPACE}{WHT} {RED}
       {WHT} {RED} {WHT} {RED}
        {WHT} {RED} {WHT}
       {RED} ":NEXT
MQ 550 PRINTTAB(12)"{DOWN}
       {BLU}PRESS <SPACE>
       {HOME}"
SH 560 SYS49931:SYS50028
BD 570 SYS49854,253,0,255,255,
       15,11,12:SYS50028:SYS49
       931:SYS50028
EX 580 PRINT"{CLR}":SYS49643,5
       :SYS50621
HC 590 SYS49854,255,255,255,25
       5,15,11,12:SYS49643,4:G
       OTO500
GC 600 PRINT"{CLR}{6 DOWN}"TAB
       (11)"P L A Y F I E L D
       {SPACE}S"
AG 610 PRINTTAB(8)"{3 DOWN}THE
        EASY WAY TO SMOOTHLY"
SP 620 PRINTTAB(5)"ANIMATE LAR
       GE GRAPHICS AREAS FOR"
JX 630 PRINTTAB(8)"PROFESSIONA
       L VIDEO EFFECTS.":RETUR
       N
RK 640 PRINTTAB(12)"{3 DOWN}PR
       ESS <SPACE> FOR":PRINTT
       AB(14)"MORE EXAMPLES":R
       ETURN
MX 650 S=54296:A=15:B=0
RJ 660 POKE53248,SL:POKE53248+
       21,255:POKE2040,252:POK
       E53248+39,6:GOSUB710
PB 670 POKE2040,251:POKE53248+
       39,14:GOSUB710
SQ 680 POKE2040,250:POKE53248+
       39,3:GOSUB710
XJ 690 POKE2040,249:POKE53248+
       39,1:POKE53248+21,254
RM 700 POKE53248,0:RETURN
CG 710 POKES,A:POKE54296,0:POK
       E54296,15:POKES,B:RETUR
       N
```

G

"Here was the toughest guy I know—weeping sentimental tears."

"This old pal of mine, an ex-ballplayer, had open-heart surgery. I gave blood for the operation.

"Afterwards, I saw him. He held my hand for the longest time, not saying anything. And then I saw: there were tears in his eyes...

"I give blood often now. And I always think of him."

When was the last time *you* gave blood?

Blood. Give a little, so someone can live.

National Blood Resource Education Program

National Heart, Lung, and Blood Institute. National Institutes of Health, Public Health Service, U.S. Department of Health and Human Services.

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ELECTRONIC BILLBOARD

EDITOR'S CHOICE

Edward Swierk

Here's a program that will turn your 64 into a vertically scrolling message board.

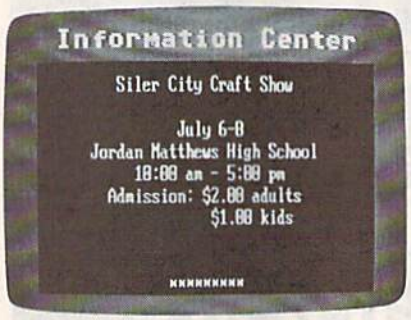
If you've ever seen one of those one-line electronic message boards in a shop, restaurant, or hotel, you know how effective these eye-catching gadgets can be. However, they're also quite expensive.

Electronic Billboard allows you to use your 64 in a similar manner to display up to 240 message lines as fine-scrolling, oversized text. And supplying the message is easy; you can type it in from the keyboard or load it from a text file created with *SpeedScript* or any other word processor.

Getting Started

Electronic Billboard consists of three programs. The first is written in BASIC. To avoid typing errors, enter it using *The Automatic Proofreader*, located elsewhere in this issue. When you've finished typing, save a copy of the program to disk as BILLBOARD.BAS.

The two remaining programs are written in machine language (ML) and must be typed in using *MLX*, the machine language entry program also located elsewhere in this issue. When *MLX* prompts you, respond with the values given below.



Electronic Billboard *can be easily used to post information on upcoming events.*

For BILLBOARD.ML

Starting address: 033C
Ending address: 03AB

For BILLBOARD.CHAR

Starting address: C000
Ending address: C807

When you've finished typing, save these programs on the disk that contains BILLBOARD.BAS. Use the filenames BILLBOARD.ML and BILLBOARD.CHAR, respectively.

When you're ready to create a billboard, simply load and run BILLBOARD.BAS. After the ML files load into memory, you're presented with an options menu.

Creating Billboards

Before you can put *Electronic Billboard* to work, you'll have to type in the message that you want displayed. There are two ways to do this: Enter your message directly into the program when you run it or use a word processor to create a message file and then run the program. If your message is long and requires considerable editing, you may prefer to use the second approach. Also, with a word processor, you can easily save your message to disk for future reference.

To input your message directly into *Electronic Billboard*, select menu option 2—*Type in a message*. Using this option, you can enter 99 message lines with as many as 35 characters each. The lines are automatically numbered for

you, so all you have to do is enter the text and press RETURN for the next line. To separate individual messages, enter a space or a minus sign (−) on a line by itself.

When you've finished, type an asterisk (*) on the last line and press RETURN. A message-board heading will be printed and your messages will begin scrolling from the bottom of the screen. To halt the display and return to the normal screen, just press Q.

If you create a message file with a word processor, you must use one that can save files in Commodore ASCII (sequential) format. You must enter your messages in a format similar to that described above. Type up to 38 characters on a line, pressing RETURN after each. Enter a minus sign on a line by itself to separate messages, and place an asterisk by itself on the last line to indicate that there are no more messages. (*Electronic Billboard* can accept no more than 240 lines of text.) When you've finished, save your file with the name BILLBOARD.DATA.

Although *SpeedScript* doesn't save files as Commodore ASCII, you can still use it to enter your messages. To do so, put the following format command at the top of your file.

```
[o38][o500][p500
```

These commands set *SpeedScript* to print a page 38 columns wide with no top or bottom margins. They also set the page length to 500 lines so that there won't be any page breaks in your text.

When entering your messages with *SpeedScript*, be sure to press RETURN at the end of each message and not at the end of each line. Enter a minus sign alone on a line to separate messages, and place an asterisk on a separate line to indicate the end of the file.

When you've finished entering your messages, print the file to disk by pressing CTRL–SHIFT–P and then pressing D (for Disk) at the prompt. Again, be sure to use the filename BILLBOARD.DATA when you save the message, otherwise *Electronic Billboard* won't be able to find it.

After the file has been saved, exit your word processor; then load and run *Electronic Billboard*. At the prompt, select option 1—*Get message data from disk file*. After the file has loaded into memory, your messages will be displayed.

Customizing the Program

Electronic Billboard is written so that it can be easily customized for almost any purpose. For example, if you were using your display at a Halloween party, you could alter the text colors to orange on black and the message-board heading to something like Spooky Notes to fit the occasion.

The variables for color reside in lines 20–60 and may be changed to any value 0–15. The text for the heading, which currently reads *Information Center*, is in line 70. When you enter the screen heading, be sure to enclose it in quotation marks and use no more than 20 characters.

The scroll speed is controlled by the variable SP in line 80. Any value in the range 1–10 is valid, where 1 is the fastest and 10 is slowest. The current value, 5, works well in most instances.

Other Considerations

If you create your message using a word processor, it's possible to get a "Data file too large" error. If this occurs, shorten your message file or increase the variable MX in line 90. Adjusting MX may require some experimentation; if you make MX too large, you could get an OUT OF MEMORY error.

Electronic Billboard uses memory locations in the range 828–933 for its machine language, 51200–53247 for screen RAM, and 61440–63487 for character RAM. Programs that use these areas, as well as some fast-load cartridges, will not work with this program.

BILLBOARD.BAS

```
HQ 10 REM COPYRIGHT 1990 COMPU
      TE! PUBLICATIONS, INC. -
      ALL RIGHTS RESERVED
CQ 20 C1=0 :REM BACKGROUND COL
      OR
MS 30 C2=3 :REM SCROLLING TEXT
      COLOR
XD 40 C3=6 :REM BORDER COLOR
HF 50 C4=6 :REM HEADING BACKGR
      OUND COLOR
KA 60 C5=3 :REM HEADING TEXT C
      OLOR
JX 70 DATA"INFORMATION CENTER"
      :REM HEADING TEXT
GJ 80 SP=5:REM SCROLL SPEED
PX 90 MX=240:REM MAXIMUM DATA
      {SPACE}FILE LENGTH
QE 100 DF$="BILLBOARD.DATA":RE
      M DATA FILE NAME
AE 110 PRINT"{DOWN}PLEASE WAIT
      {DOWN}":AD=828:F$="BILL
      BOARD.ML":GOSUB830:POKE
      872,(SP+3)*5
DH 120 AD=61440:F$="BILLBOARD.
      CHAR":GOSUB830
DG 130 DIMS1$(MX),S2$(MX):R1$=
      "{RVS}":R2$="{OFF}":S1%
      =SP*3:S2%=SP*5-5
QS 140 SP$="{39 SPACES}":PRINT
      CHR$(14)CHR$(8)
MK 150 PRINT"{CLR}{DOWN}"TAB(5
      )"ELECTRONIC BILLBOARD"
      :PRINT" COPYRIGHT 1990
      {SPACE}COMPUTE! PUBL."
PX 155 PRINTTAB(5)"ALL RIGHTS
      {SPACE}RESERVED{DOWN}"
KA 156 PRINT" (1) GET MESSAGE
      {SPACE}DATA FROM DISK F
      ILE"
BE 160 PRINT" (2) TYPE IN A ME
      SSAGE":INPUT"{DOWN} YOU
      R CHOICE";CH$
SM 170 IFCH$<>"1"ANDCH$<>"2"TH
      EN150
EA 180 IFCH$="1"THENGOSUB330
FA 190 IFCH$="2"THENGOSUB410
BH 200 PRINT"{DOWN} PRESS RETU
      RN TO START MESSAGE SCR
      OLL":PRINT" OR ENTER Q
      {SPACE}TO QUIT";
MP 210 INPUTCH$:IFCH$="Q"ORCH$
      ="Q"THENSYS2048:END
JP 220 GOSUB690:POKE53280,C3:P
      OKE53281,C1:POKE646,C2:
      GOSUB710:PRINTCHR$(147)
CR 230 FORI=0TO119:POKE55296+I
      ,C5:POKE51200+I,160:NEX
      T
DB 240 L=L+1:A$=S1$(L):B$=S2$(
      L)
JS 250 IFPEEK(198)>0THENPOKE19
      8,0:POKE808,237:POKE648
      ,4:SYS2048:END
DG 260 IFL=NTHENL=0:GOTO240
RF 270 IFA$="-"THENA$=""
HD 280 POKE214,23:PRINT:PRINTS
      P$;:POKE214,23:PRINT:PR
      INTA$;:SYS828
KC 290 IFA$=""THENFORI=1TOS1%:
      NEXT
RG 300 POKE214,23:PRINT:PRINTS
      P$;:POKE214,23:PRINT:PR
      INTB$;:SYS828
SJ 310 IFA$=""ANDL>1THENFORI=1
      TOS2%:NEXT:SYS828
RH 320 GOTO240
FM 330 OPEN1,8,2,"0:"+DF$+",S,
      R":PRINT"{DOWN} READING
       MESSAGE DATA, PLEASE W
      AIT.{2 DOWN}"
QG 340 N=N+1:PRINT"{UP} LINE";
      N:IFN>=MXTHENPRINT"
      {DOWN} DATA FILE TOO LA
      RGE.":CLOSE1:END
SD 350 IFST=64THENCLOSE1:RETUR
      N
EQ 360 GET#1,A$:PS=PS+1:IFA$<>
      CHR$(13)ANDPS<39THENC$=
      C$+A$:GOTO350
KA 370 IFMID$(C$,LEN(C$),1)="
      {SPACE}"THENC$=LEFT$(C$
      ,LEN(C$)-1)
CS 380 S1$(N)=C$:C$="":PS=0:IF
      S1$(N)="-"THENGOTO340
DX 390 IFS1$(N)="*"THENS1$(N)=
      "-":CLOSE1:N=N+1:RETURN
CK 400 GOSUB600:GOTO340
CR 410 PRINT"{CLR}{DOWN} ENTER
       MESSAGE TEXT, PRESSING
       RETURN"
KX 420 PRINT" AFTER EACH LINE.
      ":PRINT"{DOWN} ENTER -
      {SPACE}ON A SEPARATE LI
      NE AFTER"
JP 430 PRINT" EACH MESSAGE. EN
      TER * TO END INPUT.
      {DOWN}"
RD 440 N=N+1:IFN<10THENPRINT"
      {SPACE}";
XM 450 IFN>99THENS1$(N)="-":N=
      N+1:RETURN
RD 460 NN$=STR$(N):PRINTRIGHT$
      (NN$,LEN(NN$)-1)":";:ZZ
      $=CHR$(20)
RD 470 PS=0:C$=""
XS 480 PRINTCHR$(166)CHR$(157)
      ;
DK 490 GETA$:IFA$=""OR(A$=CHR$
      (24)ANDC$="")THEN490
BG 500 PRINT" "CHR$(157);
BR 510 IFA$=ZZ$ANDLEN(C$)>0THE
      NC$=LEFT$(C$,LEN(C$)-1)
      :PRINTA$;:PS=PS-1:GOTO4
      80
MX 520 IFA$=CHR$(24)THENFORZ=1
      TOLEN(C$):PRINTZZ$;:NEX
```

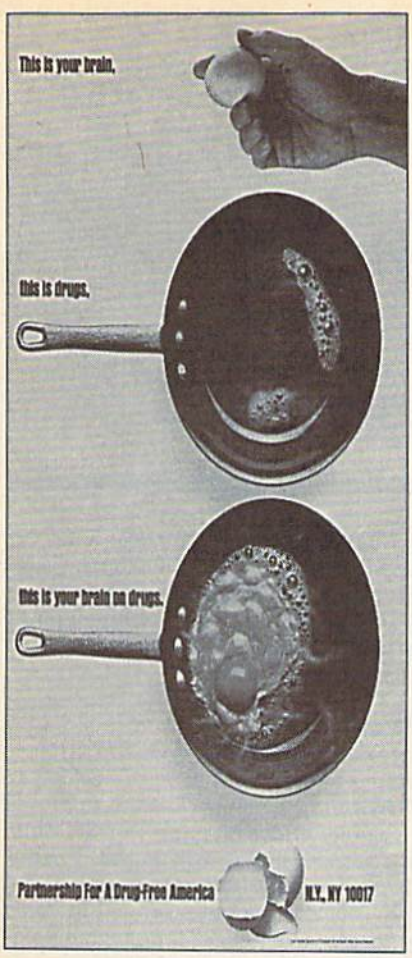
```
      T:GOTO470
JM 530 IFA$=CHR$(13)ANDC$<>""T
      HENPRINTA$;:GOTO570
GX 540 IF(ASC(A$)AND127)<32THE
      N480
EB 550 IFPS>34THEN480
EK 560 PRINTA$;:C$=C$+A$:POKE2
      12,0:PS=PS+1:GOTO480
AD 570 S1$(N)=C$:IFS1$(N)="-"T
      HENGOTO440
DB 580 IFS1$(N)="*"THENS1$(N)=
      "-":N=N+1:RETURN
FP 590 GOSUB600:GOTO440
KA 600 A$=S1$(N):S1$="":S2$=""
      :IFLEN(A$)=0THENRETURN
QQ 610 FORI=1TOLEN(A$):CH=ASC(
      MID$(A$,I,1))
ME 620 IFCH>32ANDCH<64THENS1$=
      S1$+R1$+CHR$(CH+63)+R2$
      :S2$=S2$+R1$+CHR$(CH+12
      7)+R2$
PE 630 IFCH=65OR(CH>66ANDCH<94
      )THENS1$=S1$+CHR$(CH):S
      2$=S2$+CHR$(CH-32)
JQ 640 IFCH=66THENS1$=S1$+"B":
      S2$=S2$+CHR$(34)+CHR$(3
      4)+CHR$(20)
AP 650 IFCH>192ANDCH<218THENS1
      $=S1$+CHR$(CH):S2$=S2$+
      CHR$(CH-32)
JG 660 IFCH=32THENS1$=S1$+" ":
      S2$=S2$+" "
BX 670 NEXT:S1$(N)=LEFT$(SP$,2
      0-LEN(A$)/2)+S1$:S2$(N)
      =LEFT$(SP$,20-LEN(A$)/2
      )+S2$
JA 680 RETURN
RK 690 POKE56576,PEEK(56576)AN
      D252:POKE53272,44:POKE6
      48,200
DG 700 POKE53265,PEEK(53265)AN
      D247:PRINTCHR$(147):POK
      E808,234:RETURN
JK 710 FORI=52224TO52672:POKEI
      ,255:NEXT:FORI=0TO7:POK
      E52216+I,48+I:NEXT:V=53
      248
MJ 720 POKEV+21,127:FORI=39TO4
      6:POKEV+I,C4:NEXT:FORI=
      1TO15STEP2:POKEV+I,36:N
      EXT
DA 730 POKEV+29,255:POKEV+23,2
      55:FORI=0TO14STEP2:II=2
      4+I*24
GP 740 POKEV+I,II+256*(II>255)
      :NEXT:POKEV+16,96:POKE5
      6334,PEEK(56334)AND254
PC 750 POKE1,PEEK(1)AND251:REA
      DN$:NN=LEN(N$):FORX=1TO
      NN:PS=INT(10-NN/2)+X
JB 760 SN=INT(PS/3-.3):IFPS=3O
      RPS=6ORPS=9ORPS=12ORPS=
      15ORPS=18THENCN=2
QM 770 IFPS=1ORPS=4ORPS=7ORPS=
      10ORPS=13ORPS=16ORPS=19
      THENCN=0
BA 780 IFPS=2ORPS=5ORPS=8ORPS=
      11ORPS=14ORPS=17ORPS=20
      THENCN=1
JM 790 CH=ASC(MID$(N$,X,1)):IF
      CH>=193ANDCH<=218THENCH
      =CH-128:GOTO810
AF 800 IFCH>=64ANDCH<=90THENCH
      =CH-64
MB 810 SP=52251+64*SN+CN:FORI=
      0TO7:II=PEEK(56320+CH*8
      +I):POKESP,II:SP=SP+3:N
      EXTI,X
HR 820 POKE1,PEEK(1)OR4:POKE56
      334,PEEK(56334)OR1:RETU
      RN
MS 830 F$="0:"+F$:A2=INT(AD/25
      6):A1=AD-A2*256
AB 840 T$=F$:ZK=PEEK(53)+256*P
      EEK(54)-LEN(T$):POKE782
      ,ZK/256
SB 850 POKE781,ZK-PEEK(782)*25
      6:POKE780,LEN(T$):SYS65
      469
KM 860 POKE780,1:POKE781,8:POK
      E782,0:SYS65466:POKE780
      ,0:POKE781,A1:POKE782,A
      2
BM 870 SYS65493:IF(PEEK(783)AN
      D1)OR(191ANDST)THENPRIN
      T"ERROR LOADING "F$:END
CX 880 RETURN
```

BILLBOARD.ML

```
033C:A2 06 86 FB 20 76 03 AD 34
0344:11 D0 29 F8 18 65 FB 8D 97
034C:11 D0 20 67 03 A6 FB CA FE
0354:E0 FF D0 E6 20 76 03 A9 DD
035C:17 8D 11 D0 20 76 03 20 81
0364:7C 03 60 A0 28 A2 FF CA 16
036C:E0 00 D0 FB 88 C0 00 D0 D4
0374:F4 60 AD 11 D0 10 FB 60 F2
037C:A2 00 BD A0 C8 9D 78 C8 0C
0384:E8 D0 F7 BD A0 C9 9D 78 ED
038C:C9 E8 D0 F7 BD A0 CA 9D EE
0394:78 CA E8 D0 F7 BD A0 CB 77
039C:9D 78 CB E8 E0 48 D0 F5 57
03A4:60 00 00 00 00 00 00 00 DA
```

BILLBOARD.CHAR

```
C000:00 00 00 00 00 00 00 00 81
C008:00 00 00 00 00 00 78 0C 86
C010:00 00 E0 60 60 60 78 6C 95
C018:00 00 00 00 00 00 7C C6 59
C020:00 00 1C 0C 0C 0C 3C 6C 5B
C028:00 00 00 00 00 00 7C C6 69
C030:00 00 38 6C 64 60 60 F0 D5
C038:00 00 00 00 00 00 76 CC 73
C040:00 00 E0 60 60 60 6C 76 B7
C048:00 00 00 18 18 00 38 18 94
C050:00 00 00 06 06 00 0E 06 84
C058:00 00 E0 60 60 60 66 6C B9
C060:00 00 38 18 18 18 18 18 D3
C068:00 00 00 00 00 00 EC FE C2
C070:00 00 00 00 00 00 DC 66 12
C078:00 00 00 00 00 00 7C C6 B9
C080:00 00 00 00 00 00 DC 66 22
C088:00 00 00 00 00 00 76 CC C3
C090:00 00 00 00 00 00 DC 76 42
C098:00 00 00 00 00 00 7C C6 D9
C0A0:00 00 10 30 30 30 FC 30 93
C0A8:00 00 00 00 00 00 CC CC 90
C0B0:00 00 00 00 00 00 66 66 65
C0B8:00 00 00 00 00 00 C6 C6 8E
C0C0:00 00 00 00 00 00 C6 6C 3C
C0C8:00 00 00 00 00 00 C6 C6 9E
C0D0:00 00 00 00 00 00 FE CC 1D
C0D8:00 00 3C 30 30 30 30 30 B7
C0E0:00 00 00 00 00 00 00 00 62
C0E8:00 00 3C 0C 0C 0C 0C 0C 67
C0F0:00 00 00 00 00 00 00 00 72
C0F8:00 00 00 00 00 00 00 00 7A
C100:00 00 00 00 00 00 00 00 83
C108:7C CC CC CC 76 00 00 00 17
C110:66 66 66 66 7C 00 00 00 77
C118:C0 C0 C0 C6 7C 00 00 00 94
C120:CC CC CC CC 76 00 00 00 57
C128:FE C0 C0 C6 7C 00 00 00 C3
C130:60 60 60 60 F0 00 00 00 95
C138:CC CC CC 7C 0C CC 78 00 3B
C140:66 66 66 66 E6 00 00 00 FA
C148:18 18 18 18 3C 00 00 00 44
C150:06 06 06 06 66 66 3C 00 BE
C158:78 78 6C 66 E6 00 00 00 61
C160:18 18 18 18 3C 00 00 00 5C
C168:D6 D6 D6 D6 C6 00 00 00 8B
C170:66 66 66 66 66 00 00 00 27
C178:C6 C6 C6 C6 7C 00 00 00 3A
C180:66 66 66 7C 60 60 F0 00 CB
C188:CC CC CC 7C 0C 0C 1E 00 D3
C190:66 60 60 60 F0 00 00 00 F8
C198:60 38 0C C6 7C 00 00 00 2C
C1A0:30 30 30 36 1C 00 00 00 92
C1A8:CC CC CC CC 76 00 00 00 DF
C1B0:66 66 66 3C 18 00 00 00 52
C1B8:D6 D6 D6 FE 6C 00 00 00 8B
C1C0:38 38 38 6C C6 00 00 00 72
C1C8:C6 C6 C6 7E 06 0C F8 00 74
C1D0:18 30 60 C6 FE 00 00 00 DC
C1D8:30 30 30 30 3C 00 00 00 6B
C1E0:00 00 00 00 00 00 00 00 64
C1E8:0C 0C 0C 0C 3C 00 00 00 99
C1F0:00 00 00 00 00 00 00 00 74
C1F8:00 00 00 00 00 00 00 00 7C
C200:00 00 00 00 00 00 00 00 85
C208:00 00 10 38 6C C6 C6 C6 E5
C210:00 00 FC 66 66 66 66 7C B1
C218:00 00 3C 66 C2 C0 C0 C0 E6
C220:00 00 F8 6C 66 66 66 66 8B
C228:00 00 FE 66 62 60 64 7C CD
C230:00 00 FE 66 62 60 64 7C D5
C238:00 00 3C 66 C2 C0 C0 C0 07
C240:00 00 C6 C6 C6 C6 C6 FE E8
C248:00 00 3C 18 18 18 18 18 40
C250:00 00 1E 0C 0C 0C 0C 0C 0F
C258:00 00 E6 66 6C 6C 78 78 9F
C260:00 00 E0 60 60 60 60 60 AD
C268:00 00 C6 C6 EE FE FE D6 7B
C270:00 00 C6 C6 E6 F6 F6 DE 1B
C278:00 00 38 6C C6 C6 C6 C6 71
C280:00 00 FC 66 66 66 66 7C 22
C288:00 00 7C C6 C6 C6 C6 C6 AF
C290:00 00 FC 66 66 66 66 7C 32
C298:00 00 7C C6 C6 C0 60 38 4C
C2A0:00 00 7E 7E 5A 18 18 18 59
C2A8:00 00 C6 C6 C6 C6 C6 C6 19
C2B0:00 00 C6 C6 C6 C6 C6 C6 21
C2B8:00 00 C6 C6 C6 C6 D6 D6 59
C2C0:00 00 C6 C6 6C 6C 38 38 49
C2C8:00 00 66 66 66 66 66 3C 57
C2D0:00 00 FE C6 8C 0C 18 30 97
C2D8:00 00 00 00 00 00 00 00 5E
C2E0:00 00 00 00 00 00 00 00 66
C2E8:00 00 00 00 00 00 00 00 6E
C2F0:00 00 00 00 00 00 00 00 76
C2F8:00 00 00 00 00 00 00 00 7E
C300:00 00 00 00 00 00 00 00 87
C308:FE C6 C6 C6 C6 00 00 00 3C
C310:66 66 66 66 FC 00 00 00 7F
C318:C0 C0 C2 66 3C 00 00 00 D0
C320:66 66 66 6C F8 00 00 00 CF
C328:64 60 62 66 FE 00 00 00 A4
C330:64 60 60 60 F0 00 00 00 9B
C338:DE C6 C6 66 3A 00 00 00 F1
C340:C6 C6 C6 C6 C6 00 00 00 58
C348:18 18 18 18 3C 00 00 00 48
C350:0C CC CC CC 78 00 00 00 3B
C358:78 6C 6C 66 E6 00 00 00 62
C360:60 60 62 66 FE 00 00 00 DA
C368:C6 C6 C6 C6 C6 00 00 00 80
C370:DE CE C6 C6 C6 00 00 00 96
C378:C6 C6 C6 6C 38 00 00 00 76
C380:60 60 60 60 F0 00 00 00 E9
C388:C6 D6 DE 7C 0C 06 00 00 45
C390:6C 6C 66 66 F6 00 00 00 54
C398:0C 06 C6 C6 7C 00 00 00 D0
C3A0:18 18 18 18 3C 00 00 00 A0
C3A8:C6 C6 C6 C6 7C 00 00 00 6E
C3B0:C6 C6 6C 38 10 00 00 00 DE
C3B8:D6 D6 FE 7C 6C 00 00 00 6C
C3C0:38 6C 6C C6 C6 00 00 00 AF
C3C8:18 18 18 18 3C 00 00 00 C8
C3D0:30 60 62 C6 FE 00 00 00 39
C3D8:00 00 00 00 00 00 00 00 60
C3E0:00 00 00 00 00 00 00 00 68
C3E8:00 00 00 00 00 00 00 00 70
C3F0:00 00 00 00 00 00 00 00 78
C3F8:00 00 00 00 00 00 00 00 80
C400:C3 99 91 91 9F 99 C3 FF 08
C408:E7 C3 99 81 99 99 99 FF 28
C410:83 99 99 83 99 99 83 FF 67
C418:C3 99 9F 9F 9F 99 C3 FF C2
C420:87 93 99 99 99 93 87 FF 49
C428:81 9F 9F 87 9F 9F 81 FF 45
C430:81 9F 9F 87 9F 9F 9F FF 89
```



bug-swatter

• One character is missing from line 1080 of *Think Tank* from the April 1990 issue. The corrected line is

```
1080 RETURN:DATA0,0,0,16,0,0,0
     ,0,0,0,0,16,0,66,0,136,
     0,0,40,8,0,3,32,32,32
```

• We've received numerous letters and phone calls from readers who say that *Apple Willy* (April 1990) doesn't run on their machines. Rest assured that the listing is all right; the program just takes a long time to initialize its graphics.

• Line 30 of *The Automatic Proofreader* (January–May 1990) contained the command WAIT CLR. The WAIT command doesn't have a CLR option, so BASIC issues a SYNTAX ERROR. The line should read

```
30 IF VE=17165 THEN LO=45:HI=4
   6:GRAPHIC CLR:PRINT"128"
```

• *MLX* won't accept the starting and ending addresses for *Execution Analyzer* or the ending address for *Bassem* (April 1990). This occurs as a result of *MLX*'s attempt to catch invalid addresses. But in this case, the address check prevents you from entering the program. To correct this, and to avoid a similar problem in the future, change line 1040 in *MLX* as follows:

```
1040 IF(AD>511 AND AD<65280)TH
   EN GOSUB1080:F=0:RETURN
```

Line 160 of *MLX* (both the 64 and 128 versions) has given many readers trouble. The characters {8 @}(or {9 @} for the 128) indicate that the user should hold down the Commodore key and press the @ key eight times (nine times on the 128). If you've had difficulty typing in this line, go back and carefully reread the article "How to Type in *COMPUTE!'s Gazette* Programs." It explains the symbols used in the program listings and how to enter them. **G**

Electronic Billboard

```
C438:C3 99 9F 91 99 99 C3 FF D1
C440:99 99 99 81 99 99 99 FF AE
C448:C3 E7 E7 E7 E7 E7 C3 FF 8F
C450:E1 F3 F3 F3 F3 93 C7 FF 03
C458:99 93 87 8F 87 93 99 FF 3B
C460:9F 9F 9F 9F 9F 9F 81 FF 0E
C468:9C 88 80 94 9C 9C 9C FF 4C
C470:99 89 81 81 91 99 99 FF 97
C478:C3 99 99 99 99 99 C3 FF D1
C480:83 99 99 83 9F 9F 9F FF 58
C488:C3 99 99 99 99 C3 F1 FF E6
C490:83 99 99 83 87 93 99 FF 6B
C498:C3 99 9F C3 F9 99 C3 FF 58
C4A0:81 E7 E7 E7 E7 E7 E7 FF 0F
C4A8:99 99 99 99 99 99 C3 FF EC
C4B0:99 99 99 99 99 C3 E7 FF E5
C4B8:9C 9C 9C 94 80 88 9C FF F3
C4C0:99 99 C3 E7 C3 99 99 FF 2C
C4C8:99 99 99 C3 E7 E7 E7 FF A3
C4D0:81 F9 F3 E7 CF 9F 81 FF 96
C4D8:C3 CF CF CF CF CF C3 FF 74
C4E0:F3 ED CF 83 CF 9D 03 FF 0D
C4E8:C3 F3 F3 F3 F3 F3 C3 FF 06
C4F0:FF E7 C3 81 E7 E7 E7 E7 9B
C4F8:FF EF CF 80 80 CF EF FF A3
C500:FF FF FF FF FF FF FF FF 8B
C508:E7 E7 E7 E7 FF FF E7 FF CC
C510:99 99 99 FF FF FF FF FF 02
C518:99 99 00 99 00 99 99 FF 0A
C520:E7 C1 9F C3 F9 83 E7 FF ED
C528:9D 99 F3 E7 CF 99 B9 FF 3E
C530:C3 99 C3 C7 98 99 C0 FF A5
C538:F9 F3 E7 FF FF FF FF FF BA
C540:F3 E7 CF CF CF E7 F3 FF BC
C548:CF E7 F3 F3 F3 E7 CF FF 52
C550:FF 99 C3 00 C3 99 FF FF 3F
C558:FF E7 E7 81 E7 E7 FF FF D1
C560:FF FF FF FF FF E7 E7 CF 2B
C568:FF FF FF 81 FF FF FF FF 0C
C570:FF FF FF FF FF E7 E7 FF 6B
C578:FF FC F9 F3 E7 CF 9F FF 7F
C580:C3 99 91 89 99 99 C3 FF D9
C588:E7 E7 C7 E7 E7 E7 81 FF 5B
C590:C3 99 F9 F3 CF 9F 81 FF E2
C598:C3 99 F9 E3 F9 99 C3 FF A7
C5A0:F9 F1 E1 99 80 F9 F9 FF 5B
C5A8:81 9F 83 F9 F9 99 C3 FF AA
C5B0:C3 99 9F 83 99 99 C3 FF 6B
C5B8:81 99 F3 E7 E7 E7 E7 FF 17
C5C0:C3 99 99 C3 99 99 C3 FF BE
C5C8:C3 99 99 C1 F9 99 C3 FF A9
C5D0:FF FF E7 FF FF E7 FF FF F8
C5D8:FF FF E7 FF FF E7 E7 CF A0
C5E0:F1 E7 CF 9F CF E7 F1 FF 55
C5E8:FF FF 81 FF 81 FF FF FF B0
C5F0:8F E7 F3 F9 F3 E7 8F FF BA
C5F8:C3 99 F9 F3 E7 FF E7 FF 5A
C600:00 00 18 3C 3C 3C 3C 18 B7
C608:00 00 66 66 66 24 00 00 8C
C610:00 00 00 6C 6C FE 6C 6C 09
C618:00 18 18 7C C6 C2 C0 7C B5
C620:00 00 00 00 00 C2 C6 0C 18 0F
C628:00 00 38 6C 6C 6C 38 76 7F
C630:00 00 30 30 30 60 00 00 C9
C638:00 00 0C 18 30 30 30 30 9B
C640:00 00 30 18 0C 0C 0C 0C 0A
C648:00 00 00 00 00 00 66 3C 7E 66
C650:00 00 00 00 00 18 18 7E EC
C658:00 00 00 00 00 00 00 00 E5
C660:00 00 00 00 00 00 00 FE EC
C668:00 00 00 00 00 00 00 00 F5
C670:00 00 00 00 02 06 0C 18 56
C678:00 00 7C C6 C6 C6 D6 D6 D7
C680:00 00 18 38 78 18 18 18 01
C688:00 00 7C C6 06 06 0C 18 8A
C690:00 00 7C C6 06 06 06 3C AA
C698:00 00 0C 1C 3C 6C CC CC 63
C6A0:00 00 FE C0 C0 C0 C0 FC A1
C6A8:00 00 38 60 C0 C0 C0 FC CA
C6B0:00 00 FE C6 06 06 0C 18 03
C6B8:00 00 7C C6 C6 C6 C6 7C 9D
C6C0:00 00 7C C6 C6 C6 C6 7E A7
C6C8:00 00 00 00 18 18 00 00 77
C6D0:00 00 00 00 18 18 00 00 7F
C6D8:00 00 00 06 0C 18 30 60 48
C6E0:00 00 00 00 00 7E 00 00 68
C6E8:00 00 00 60 30 18 0C 06 7C
C6F0:00 00 7C C6 C6 06 0C 18 F8
C6F8:00 00 00 00 00 00 00 00 86
C700:18 18 00 18 18 00 00 00 E3
C708:00 00 00 00 00 00 00 00 97
C710:6C FE 6C 6C 00 00 00 00 E9
C718:06 06 86 C6 7C 18 18 00 DD
C720:18 30 60 C6 86 00 00 00 74
C728:DC CC CC CC 7A 00 00 00 93
C730:00 00 00 00 00 00 00 00 BF
C738:30 30 30 18 0C 00 00 00 D3
C740:0C 0C 0C 18 30 00 00 00 5D
C748:3C 66 00 00 00 00 00 00 8F
C750:18 18 00 00 00 00 00 00 F1
C758:00 00 18 18 18 30 00 00 ED
C760:00 00 00 00 00 00 00 00 EF
C768:00 00 00 18 18 00 00 00 3A
C770:18 30 60 C0 80 00 00 00 34
C778:D6 C6 C6 C6 7C 00 00 00 4E
C780:18 18 18 18 7E 00 00 00 9A
C788:30 30 60 C6 FE 00 00 00 AC
C790:06 06 06 C6 7C 00 00 00 B5
C798:FE 0C 0C 0C 0C 00 00 00 4D
C7A0:06 06 06 C6 7C 00 00 00 C5
C7A8:C6 C6 C6 C6 7C 00 00 00 76
C7B0:30 30 30 30 30 00 00 00 EE
C7B8:C6 C6 C6 C6 7C 00 00 00 86
C7C0:06 06 06 0C 78 00 00 00 1A
C7C8:00 00 18 18 00 00 00 00 DC
C7D0:00 00 18 18 30 00 00 00 66
C7D8:30 18 0C 06 00 00 00 00 68
C7E0:7E 00 00 00 00 00 00 00 AF
C7E8:0C 18 30 60 00 00 00 00 90
C7F0:18 18 00 18 18 00 00 00 D4
C7F8:00 00 00 00 00 00 00 80 09
C800:FF 00 00 00 00 00 00 00 91
```

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How to Type In COMPUTE!'s Gazette Programs

Each month, *COMPUTE!'s Gazette* publishes programs for the Commodore 128 and 64. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We regularly publish two programs designed to make typing easier: *The Automatic Proofreader*, for BASIC programs, and *MLX*, for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off and then on, erasing what was in memory. This could cause you to lose valuable data, so be sure to *save a program before you run it*. If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from *Gazette*, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor-down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be shifted (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight shifted A's).

If a key is enclosed in special brackets, [ ], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT} and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is the *quote mode*.

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. In this case, you can use the DEL key to back up and edit the line. Type another quotation mark and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↑	

For Commodore 64 Only

[1]	COMMODORE + 1	
[2]	COMMODORE + 2	
[3]	COMMODORE + 3	
[4]	COMMODORE + 4	
[5]	COMMODORE + 5	
[6]	COMMODORE + 6	
[7]	COMMODORE + 7	
[8]	COMMODORE + 8	

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The Automatic Proofreader

Philip I. Nelson

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in the *Proofreader exactly* as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press RETURN. After the program displays the message "Proofreader Active," you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the *Proofreader* displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If not, check for your mistake and correct the line.

The *Proofreader* ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. However, spaces inside quotes are almost always significant, so the program pays attention to them.

The *Proofreader* does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it, moving the cursor back to the line, and pressing RETURN.

If you're using the *Proofreader* on the 128, *do not perform any GRAPHIC commands while the* Proofreader *is active*. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the *Proofreader*—to another memory area, causing the *Proofreader* to crash. The same thing happens if you run any program with a GRAPHIC command while the *Proofreader* is in memory.

Though the *Proofreader* doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

When using the *Proofreader* with another utility, disable *both* programs before running a BASIC program. While the *Proofreader* seems unaffected by most utilities, there's no way to promise it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The Automatic Proofreader

```
10 VE=PEEK(772)+256*PEEK(773):LO
   =43:HI=44:PRINT "{CLR}{WHT}AU
   TOMATIC PROOFREADER FOR ";
20 IF VE=42364 THEN PRINT"C-64"
30 IF VE=17165 THEN LO=45:HI=46:
   WAIT CLR:PRINT "128"
40 SA=(PEEK(LO)+256*PEEK(HI))+6:
   FOR J=SA TO SA+166:READ B:POK
   E J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*ERR
   OR* CHECK TYPING IN DATA STAT
   EMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:RS
   =SA+RF:HB=INT(RS/256):LB=RS-(
   256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,LB:
   POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*ERR
   OR* RELOAD PROGRAM AND CHECK
   {SPACE}FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14,2
   2:POKE SA+18,23:POKESA+29,224
   :POKESA+139,224
100 POKE SA+149,PEEK(772):POKE S
   A+150,PEEK(773):PRINT "{CLR}P
   ROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:PO
   KE (PEEK(LO)+256*PEEK(HI))-1,
   0:NEW
120 DATA120,169,73,141,4,3,169,3
   ,141,5,3,88,96,165,20,133,167
130 DATA165,21,133,168,169,0,141
   ,0,255,162,31,181,199,157,227
140 DATA3,202,16,248,169,19,32,2
   10,255,169,18,32,210,255,160
150 DATA0,132,180,132,176,136,23
   0,180,200,185,0,2,240,46,201
160 DATA34,208,8,72,165,176,73,2
   55,133,176,104,72,201,32,208
170 DATA7,165,176,208,3,104,208,
   226,104,166,180,24,165,167
180 DATA121,0,2,133,167,165,168,
   105,0,133,168,202,208,239,240
190 DATA202,165,167,69,168,72,41
   ,15,168,185,211,3,32,210,255
200 DATA104,74,74,74,74,168,185,
   211,3,32,210,255,162,31,189
210 DATA227,3,149,199,202,16,248
   ,169,146,32,210,255,76,86,137
220 DATA65,66,67,68,69,70,71,72,
   74,75,77,80,81,82,83,88
230 DATA13,2,7,167,31,32,151,116
   ,117,151,128,129,167,136,137
```

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MLX Machine Language Entry Program for Commodore 64

Ottis R. Cowper

MLX is a labor-saving utility that allows almost fail-safe entry of Commodore 64 machine language programs.

Type in and save some copies of *MLX*—you'll want to use it to enter future ML programs from *COMPUTE!'s Gazette*. When you're ready to enter an ML program, load and run *MLX*. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the *MLX*-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in *MLX*) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters *A–F*. But even if you know nothing about ML or hex, you should have no trouble using *MLX*.

After you've entered the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is Enter Data. If you're just starting to type in a program, pick this. Press the E key and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you stopped typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering a Listing

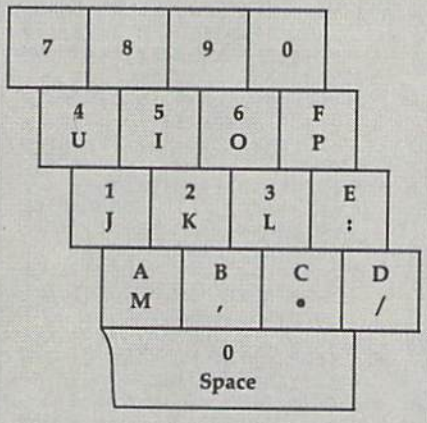
Once you're in Enter mode, *MLX* prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an *MLX*-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows *MLX* to check your typing.

When you enter a line, *MLX* recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if *MLX* detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; *MLX* automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; *MLX* automatically enters and checks the line after you type the last digit.

Only the numerals 0–9 and the letters *A–F* can be entered. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, a numeric keypad function is included. The keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figure below shows the keypad configuration.



MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, *MLX* will catch your mistake. There is one error that can slip past *MLX*: Because of the checksum formula used, *MLX* won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. If you mess up a line badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character, *MLX* disables RETURN until the cursor returns to the start of a line. Remember, press CLR/HOME to quickly get to a line-number prompt.

To make corrections in a line that *MLX* has redisplayed for editing, compare the line on the screen with the one printed in the listing and then move the cursor to the mistake and type the correct key. The cursor-left and -right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells *MLX* to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch or if you want to get to a line-number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, Display Data, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, *MLX* asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. *MLX* displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (*MLX* finishes printing the current line before halting.) Press the space bar again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are Save File and Load File. When you press S or L, *MLX* asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save. This is normal behavior. *MLX* opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Also note that the drive prefix 0: is added to the filename (line 750), so this should *not* be included when entering the name. This also precludes the use of @ for save-with-replace, so be sure to give each version saved a different name.

Remember that *MLX* saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When you're saving a partially completed listing, make sure to note the address where you stopped typing.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. It also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran *MLX*; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started *MLX*; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started *MLX*. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun *MLX*, being careful to enter the correct starting and ending addresses.

The Quit menu option has the obvious effect—it stops *MLX* and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or press any other key to return to the menu. After quitting, you can type RUN again and reenter *MLX* without losing your data, as long as you don't use the Clear Workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready for the results. Refer to the corresponding article for details on loading and running the program.

An Ounce of Prevention

By the time you've finished typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use *The Automatic Proofreader* to type the new *MLX*, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses; then use the display option to verify that the data has been entered correctly. And be sure to test the save and load options several times to ensure that you can recall your work from disk or tape.

64 MLX

```
EK 100 POKE 56,50:CLR:DIM IN$,I,
       J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z4=
       254:Z5=255:Z6=256:Z7=127
CJ 120 FA=PEEK(45)+Z6*PEEK(46):B
       S=PEEK(55)+Z6*PEEK(56):H$
       ="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}":S
       $=" ":D$=CHR$(20):Z$=CHR$
       (0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD+2
       3:POKE I,0:NEXT:POKE SD+2
       4,15:POKE 788,52
FC 150 PRINT"{CLR}"CHR$(142)CHR$
       (8):POKE 53280,15:POKE 53
       281,15
EJ 160 PRINT T$" {RED}{RVS}
       {2 SPACES}{8 @}{2 SPACES}
       "SPC(28)"{2 SPACES}{OFF}
       {BLU} MLX II {RED}{RVS}
       {2 SPACES}"SPC(28)"
       {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}{3 SPACES}C
       OMPUTE!'S MACHINE LANGUAG
       E EDITOR{3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADDRE
       SS{4}";:GOSUB300:SA=AD:GO
       SUB1040:IF F THEN180
GF 190 PRINT"{BLK}{2 SPACES}ENDI
       NG ADDRESS{4}";:GOSUB300:
       EA=AD:GOSUB1030:IF F THEN
       190
KR 200 INPUT"{3 DOWN}{BLK}CLEAR
       {SPACE}WORKSPACE [Y/N]{4}
       ";A$:IF LEFT$(A$,1)<>"Y"T
       HEN220
PG 210 PRINT"{2 DOWN}{BLU}WORKIN
       G...";:FORI=BS TO BS+EA-S
       A+7:POKE I,0:NEXT:PRINT"D
       ONE"
DR 220 PRINTTAB(10)"{2 DOWN}
       {BLK}{RVS} MLX COMMAND ME
       NU {DOWN}{4}":PRINT T$"
       {RVS}E{OFF}NTER DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISPLA
       Y DATA":PRINT T$"{RVS}L
       {OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE F
       ILE":PRINT T$"{RVS}Q{OFF}
       UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=MI
       D$("EDLSQ",I,1)THEN A=I:I
       =5
FD 270 NEXT:ON A GOTO420,610,690
       ,700,280:GOSUB1060:GOTO25
       0
EJ 280 PRINT"{RVS} QUIT ":INPUT"
       {DOWN}{4}ARE YOU SURE [Y/
       N]";A$:IF LEFT$(A$,1)<>"Y
       "THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IFLE
       N(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$=M
       ID$(IN$,3):GOSUB320:AD=AD
       *256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID$(
       B$,J,1):B=ASC(A$)-C4+(A$>
       "@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=0:
       A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(H$
       ,B+1,1);:B=A-B*C6:PRINT M
       ID$(H$,B+1,1);:RETURN
RR 360 A=INT(AD/Z6):GOSUB350:A=A
       D-A*Z6:GOSUB350:PRINT":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*CK
       +Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
       {4}";:GOSUB300:IF IN$<>N$
       THEN GOSUB1030:IF F THEN
       400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA ":
       GOSUB400:IF IN$=N$ THEN22
       0
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F T
       HEN PRINT IN$:PRINT"{UP}
       {5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$=S
       $:FOR J=1 TO 2:IF F THEN
       {SPACE}B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<24
       THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A$>
       "@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-3*
       (A$=".")-4*(A$="/")-5*(A$
       ="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":")
       -9*(A$="U")-10*(A$="I")-1
       1*(A$="O")-12*(A$="P")
CM 487 A=A-13*(A$=S$):IF A THEN
       {SPACE}A$=MID$("ABCD123E4
       56F0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J=1
       )OR F)THEN PRINT B$;:J=2:
       NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRINT
       B$:J=2:NEXT:I=24:NEXT:F=
       0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF THEN
       PRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR((
       I=0)AND(J=1))THEN GOSUB10
       60:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;:J
       =2-J:IF J THEN PRINT L$;:
       I=I-3
QS 540 PRINT A$;:NEXT J:PRINT S$
       ;
PM 550 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:INPUT#3,IN$:I
       F IN$=N$ THEN CLOSE3:GOTO
       220
QC 560 FOR I=1 TO 25 STEP3:B$=MI
       D$(IN$,I):GOSUB320:IF I<2
       5 THEN GOSUB380:A(I/3)=A
PK 570 NEXT:IF A<>CK THEN GOSUB1
       060:PRINT"{BLK}{RVS} ERRO

PK 570 NEXT:IF A<>CK THEN GOSUB1
       060:PRINT"{BLK}{RVS} ERRO
       R: REENTER LINE {4}":F=1:
       GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FOR
       {SPACE}I=0 TO 7:POKE B+I,
       A(I):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN CLO
       SE3:PRINT"{DOWN}{BLU}** E
       ND OF ENTRY **{BLK}
       {2 DOWN}":GOTO700
```

```
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS} DI
       SPLAY DATA ":GOSUB400:IF
       {SPACE}INS=N$ THEN220
RJ 620 PRINT"{DOWN}{BLU}PRESS:
       {RVS}SPACE{OFF} TO PAUSE,
        {RVS}RETURN{OFF} TO BREA
       K{4}{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FORI=
       BTO B+7:A=PEEK(I):GOSUB35
       0:GOSUB380:PRINT S$;
CC 640 NEXT:PRINT"{RVS}";:A=CK:G
       OSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA THEN
       PRINT"{DOWN}{BLU}** END O
       F DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GOSU
       B1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOSUB
       1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD DA
       TA ":OP=1:GOTO710
PC 700 PRINT"{DOWN}{RVS} SAVE FI
       LE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILENA
       ME{4}";IN$:IF IN$=N$ THEN
       220
PR 720 F=0:PRINT"{DOWN}{BLK}
       {RVS}T{OFF}APE OR {RVS}D
       {OFF}ISK: {4}";
FP 730 GET A$:IF A$="T"THEN PRIN
       T"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8,1
       5,"I0:":B=EA-SA:IN$="0:"+
       IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":GOS
       UB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(AH*
       256):PRINT#1,CHR$(AL);CHR
       $(AH);
PE 780 FOR I=0 TO B:PRINT#1,CHR$
       (PEEK(BS+I));:IF ST THEN8
       00
FC 790 NEXT:CLOSE1:CLOSE15:GOTO9
       40
GS 800 GOSUB1060:PRINT"{DOWN}
       {BLK}ERROR DURING SAVE:
       {4}":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":GOS
       UB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z$)
       +256*ASC(B$+Z$):IF AD<>SA
        THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:POK
       E BS+I,ASC(A$+Z$):IF(I<>B
       )AND ST THEN F=2:AD=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F>0
       )+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN C
       LOSE1:CLOSE15:GOSUB1060:P
       RINT"{RVS}ERROR: "A$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE18
       7,PEEK(FA+3):POKE188,PEEK
       (FA+4):IFOP=0THEN920
HJ 890 SYS 63466:IF(PEEK(783)AND
       1)THEN GOSUB1060:PRINT"
       {DOWN}{RVS} FILE NOT FOUN
       D ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(830
       ):IF AD<>SA THEN F=1:GOTO
       970
SC 910 A=PEEK(831)+256*PEEK(832)
       -1:F=F-2*(A<EA)-3*(A>EA):
       AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:POK
       E780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOSUB
       1010:ON OP GOTO950:SYS 63
       591
AE 940 GOSUB1080:PRINT"{BLU}** S
       AVE COMPLETED **":GOTO220
XP 950 POKE147,0:SYS 63562:IF ST
       >0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}** L
       OAD COMPLETED **":GOTO220
DP 970 GOSUB1060:PRINT"{BLK}
       {RVS}ERROR DURING LOAD:
       {DOWN}{4}":ON F GOSUB980,
       990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTING
       {SPACE}ADDRESS (";:GOSUB3
       60:PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:AD
       =SA+AD:GOSUB360:PRINT D$:
       RETURN
FD 1000 PRINT"TRUNCATED AT ENDIN
       G ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH*2
       56):POKE193,AL:POKE194,A
       H
FF 1020 AH=INT(B/256):AL=B-(AH*2
       56):POKE174,AL:POKE175,A
       H:RETURN
FX 1030 IF AD<SA OR AD>EA THEN10
       50
CR 1040 IF (AD>511 AND AD<65280)
        THEN GOSUB1080: F=0: RE
       TURN
HC 1050 GOSUB1060:PRINT"{RVS} IN
       VALID ADDRESS {DOWN}
       {BLK}":F=1:RETURN
AR 1060 POKE SD+5,31:POKE SD+6,2
       08:POKE SD,240:POKE SD+1
       ,4:POKE SD+4,33
DX 1070 FOR S=1 TO 100:NEXT:GOTO
       1090
PF 1080 POKE SD+5,8:POKE SD+6,24
       0:POKE SD,0:POKE SD+1,90
       :POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:POKE
        SD+4,0:POKE SD,0:POKE S
       D+1,0:RETURN
```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REVIEWS

Search for the Titanic

Have you ever wondered how sailors pass the time on long sea voyages? What could they possibly do with so much time on their hands while their vessel slowly churns its way across the big blue? If they have the foresight to take along *Search for the Titanic*, by Capstone, they can immerse themselves in a realistic oceanographic and rather complex adventure simulation.

Patience and perseverance are a good sailor's best qualities, and players better have both in tow when they launch into this simulation. The game title may be a little deceiving. Indeed, the actual searching for and finding of the sunken luxury liner, downed in 1912 by an enormous ice cube, happens only at the game's climax. This game is truly an adventure in finding numerous historical shipwrecks. From Spanish treasure galleons, lost in the stormy waters of the Gulf of Mexico, to Noah's Ark, a player could spend much of his or her adult life locating and exploring the 77 or so other undersea relics.

In painstakingly true-to-life form, the program is divided into two sections. The first phase of the simulation deals with planning the expedition, which includes buying necessary technical equipment, hiring a ship, choosing a crew, acquiring provisions, and going hat-in-hand to corporations for funding. If you've done adequate planning, the scurvy dog of a safety inspector just might let the expedition leave one of the game's 47 ports you've selected as a base of operation.

In phase 2 of the program, you get under way and search for the chosen wreck. Equipped with all the technical gadgetry you can afford to buy or rent, along with the wreck coordinates and the provided world map, you set off on your adventure.

To aid in your exploration, eight screens can be called up for special purposes. Included are a radio screen to record messages and call for help, plus navigation, piloting, sonar, and dive screens. There are reportedly more than 100 map screens to help you navigate the world waterways. I didn't count them but there was a multitude.

> *This game is truly an adventure in finding numerous historical shipwrecks—from Spanish treasure galleons to Noah's Ark to the* **Titanic** *itself.*

Don't expect to start off with a reputation like Bob Ballard (who found and photographed the *Titanic*) or Jacques Cousteau. You start the simulation as a nobody. You have to build a reputation as a master wreck finder by starting small. With limited funding, a player just starting out is restricted to a very small boat and few crew members. As your list of found wrecks grows, so does your reputation. At that point, big money investors begin to turn loose their funds for larger vessels and more costly expeditions.

For landlubbers, there is a built-in cheat device so they can immediately begin to search for the *Titanic* without reputation development. Selecting this option from the menu grants a player notoriety and plenty of money. The largest exploring ship available, the Voyager, can be outfitted with the most expensive equipment, a crew of 55, and a minisub. Even with these advantages, it's a large, deep, and wide ocean out there, and locating the 46,000-ton pride of the White Star Line is not easy. To make the challenge tougher, your investors insist that you seek out and retrieve the ship's three safes as tangible proof of your success.

Actual digitized photos of the *Titanic* wreck, taken by the Bob Ballard expedition, are your reward for finding her. Personally, I think it's only fair that any salt who can complete this be allowed to keep the contents of all three safes. How about it, Bob?

—Steve Hedrick

Search for the Titanic
Capstone Software
Distributed by IntraCorp
14160 SW 139th Ct.
Miami, FL 33186
$34.95

FaceOff!

What's black and round, weighs 4½ ounces and goes 100 miles per hour? No, not your favorite burger—a hockey puck! And while *FaceOff!* by Gamestar can only simulate the 100-mph speed, it still puts you smack into the action world of professional hockey. All right, it's not Hockey Night in Canada, but if you live in a hockey-starved area of the world as we do, it's a terrific substitute.

From the TV-camera perspective to the constant glide-and-circle motion of the skaters, this program has an uncanny feeling of reality. Graphics and sound are good, but these are not what make *FaceOff!* seem so real. It's something less definable. When playing *FaceOff!*, joystick gripped in the usual white-knuckle fashion, you get the same excitement you feel cheering at rinkside.

FaceOff! allows you to practice the three main skills needed for hockey: shooting at the goal, tending goal, and punching out other players. You can play exhibition games and then enter league action as player, coach, general manager, or commissioner of the Gamestar Hockey League.

You set up your own season and decide the number of regular and playoff games and intra- and interdivisional games. You choose the length of a period, the number of players per squad, and what type of rules you play under: full, relaxed, or Aussie, which means no rules at all. Skill levels for skaters controlled by the computer are Rookie, Veteran, and All Star.

One can play against the computer, two can play against each other, or two on the same team can challenge the computer. You change which skater you control at will, yours being a slightly different color than the skater's teammates. This works well except when two people are playing on the same side. Here's where things can get confusing, especially when your man is offscreen.

FaceOff! ***gives you the same excitement you feel cheering at rinkside.***

The screen tracks the puck, just as TV cameras do. It's easy for your skater to end up in a corner talking to the crowd and signing autographs while you struggle frantically to get him skating in the right direction. With two identical skaters . . . well, we had more fights over who was who while playing on the same team than we had battles while playing against each other!

During the game, you can change lines, pull or reinstate the goalie, and make calls from the playbook. Shot-Cam gives you a closeup view of shots made on the goal. And for those who object to how you play, there's Fight-Cam. On the ice, gloves off, you and your opponent flail away at each other to the delight of an array of fans featuring two exuberant nuns and some rowdy downing popcorn. When one skater knocks out the other, the referee drags the loser off the ice by the skates and throws him into the penalty box.

For most of us, playing the hockey game would be enough. There's plenty here: Skating against an opponent, punching him out, slipping the puck into the net, listening to the crowd and the music (although it could use more music, and a proper siren when a goal is scored), and seeing goals, assists, and penalties listed between periods (the only stat missing is shots made on goal). But *FaceOff!* offers more.

As general manager you control and coach your team. This means that you purchase a team, trade, promote, demote, and retire players. Change the personal attributes of your players, including their name, age, position, and jersey number.

As coach, you can move players from one position to another. You can also devise plays for your team and enter them into the league playbook. A play is designed from three maneuvers: Move, Pass, and Slapshot. You assign actions to the players of your choice. Once a play has been blocked out, you can add it to the playbook to be selected by any team for use in a game. There's room for 16 plays; 4 are already provided. This feature opens up a new aspect to the program by allowing you to control—for a time—the entire team. And it works so well, you might even be able to use this to test plays for your local hockey team.

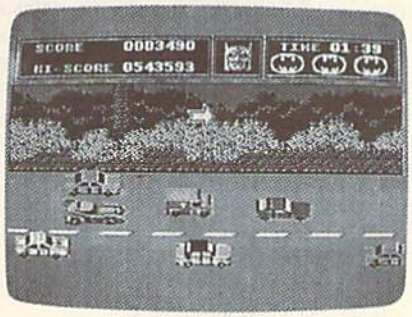
A lot is built into this program. Everything works well, and, as noted, the excitement is just about as high as watching the real thing. For hockey fans, it's great—the next best thing to going out to a game. All that's missing is the Zamboni.

—David and Robin Minnick

FaceOff!
Gamestar
Distributed by Mediagenic
3885 Bohannon Dr.
Menlo Park, CA 94025
$29.95

Batman: The Movie

Don't confuse *Batman: The Movie* with an earlier Batman game from Data East. Although the above title does not appear on the packaging, there's an important distinction between this Data East release and the earlier effort titled *Batman, The Caped Crusader.*



The earlier game was released prior to the hit movie and was based only on the Batman we know from comic books. The new game, recognizable by the movie's lettered logo and a picture of Michael Keaton as Batman, is based on the plot of the movie and is as different from the original as it can be.

I had criticized *The Caped Crusader* for, among other things, presenting Batman as a fat, diminutive figure much as he was portrayed years ago in a classic *Mad Magazine* lampoon. Here, he appears as tall and lithe as the Dark Knight we've come to know through the movie and the trade paperbacks.

Following the plot of the movie, your first adventure finds you in a maze at the Axis Chemical Plant, where you throw Batarangs to dispatch villain Jack Napier's henchmen. As you leap among the broken levels of the plant and swing on your Batrope, avoid chemical leaks, collisions with henchmen, and falls. Each hazard weakens you, and, when weak enough, one of your three lives will end.

Graphics, sound, and animation are excellent—and the challenges prevent a quick and easy solution.

Atop the screen are a scorecard, a timer, and a unique health indicator. The indicator begins by showing Batman's face. As you grow weaker, the face transforms into that of the Joker—a nice bow to the dualism expressed in the movie.

Finding and dispatching Jack Napier is the object of level 1. If you hit him with a Batarang, he'll fall into a vat of chemicals that will transform him into the Joker. (Jack Napier, jackanapes, joker. Get it?)

Level 2 has you careening through Gotham City in the Batmobile. You and Vicki Vale are trying to escape to the Batcave while avoiding the Joker's vehicles as well as police roadblocks.

A special radar in the Batmobile tells you when to turn in order to escape. If you come to a turn before you're ready, don't worry. Firing a Batrope with grappling hook will help you make a 90-degree turn with no hesitation.

Assuming you make it to the Batcave, you'll then have to work out the formula for Smilex, the Joker's deadly cosmetic. To do this, use the joystick to select various cosmetics from a roster. Remember that only one combination will work and the clock is running.

Next comes the Batwing. Fly over the Joker's parade, releasing his balloons by snipping the lines with the Batwing. Why? Surely you remember these balloons are filled with Smilex, and, if released by the Joker, it will wipe out Gotham City's population.

If you're successful, advance to the climactic scene on Gotham Cathedral. Climb the tower, avoiding henchmen, rabid rats, and crumbling floors. The object is to prevent the Joker from reaching his helicopter. While we all know how the movie ended, we're not

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* Back issues of *COMPUTE!'s PC Magazine* are $16.00 each. This publication is available only as a magazine/disk combination. Our back issue inventory consists mainly of magazines with 5.25-inch disks, but we will attempt to supply 3.5-inch disks if requested. The following issues are **NOT** available: ***PC Magazine:*** 9/87, 11/87, 9/88, 11/88.
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sure how your adventure will turn out.

In graphics, sound, and animation, *Batman: The Movie* is excellent, and the brief documentation is all that's required. All controls for each level are accessed via joystick, and the movements are logical rather than contrived. While you won't have trouble controlling your character, you should be aware that the challenges will prevent a quick and easy solution. I can recommend *Batman* highly, with only one caveat: My son advises you to toggle the music off to prevent being distracted.

—Ervin Bobo

Batman: The Movie
Data East
1850 Little Orchard St.
San Jose, CA 95125
$29.95

Spanada 128

Two questions occurred to me when I first learned about *Spanada 128*. The first had to do with wondering why any new program was written exclusively for the Commodore 128. After all, much larger companies have covered all bets by producing 64 software that might, incidentally, support a 128 mode.

The answer came easily enough: *Spanada 128* apparently uses the greater memory capacity of the 128 and makes good use of the 80-column display. The 1571 disk drive is another requirement, and it may be that the full disk is utilized without flipping.

The second question, *Why bother?* is not so easily answered.

Spanada 128 is a Spanish-to-English translator. You type in a sentence or a phrase of Spanish such as *La paloma volando en el cielo toca la alma en el cielo,* and after a few seconds the computer begins breaking down the sentence in this manner:

LA—THE, HER, IT
PALOMA—DOVE, PIGEON
VOLANDO—FLYING, BLOWING UP, BECOMING FURIOUS
EN—IN, ON, AT
EL—THE
CIELO—SKY, HEAVEN

And so on.

Then you are presented with the complete sentence, in this case, *The dove flying in the sky touches the soul in heaven.*

How are the different uses of words determined? I have no idea. Perhaps those who wrote the program are inherently poetic, but it would seem the translation could as easily have been *The pigeon blowing up in the sky plays the soul in heaven.*

Although English-to-Spanish translation is not a function of *Spanada 128*, it can be done—but only if enough English words have been stored in RAM as a result of previous Spanish-to-English translations. And if you're tempted to make back-and-forth translations, you will probably find cause for alarm.

For example, *Las golondrinas son rumbo a Capistrano* translates neatly to *The swallows are on their way to Capistrano.* English to Spanish then yields *El swallows son en their via hacia Capistrano* which translates as *The ?swallows they are in ?their way toward Capistrano.* The question marks denote words not recognized by the program.

Several modes of operation are supported, such as Advanced, which allows input of up to 253 characters instead of the usual 160; and Trace, which lists the steps the computer takes in searching for a word.

Still, my second question remains: *Why bother?*

Spanada 128 does not purport to teach Spanish or to replace textbook teaching. In fact, you must know Spanish in order to use it, for you'll quickly tire of the sample phrases in spite of their occasional humor.

> ***"How smart you are depends on what part of the country you're standing in."***
> ***—Burt Reynolds***

And if you plan to be in a Spanish-speaking country, a pocket translator will be much more effective than running back to the hotel to type into your computer what you thought that guy in the restaurant said.

In the end, *Spanada 128* seems to be a very good bit of programming, doing exactly what it says it will do, but it comes close to being dangerously narrow in topic as a 128-only program.

To be absolutely fair, I must recall what Burt Reynolds said in the movie *Smokey and the Bandit:* "How smart you are depends on what part of the country you're standing in." In the Southwest, where *Spanada 128* was produced, there will certainly be a need for such a program among the Hispanic population. But if you're an Anglo looking to learn Spanish, study this program carefully before purchasing.

—Ervin Bobo

Spanada 128
Spanada Enterprises
1 Sands Ranch Rd.
Huachuca City, AZ 85616
$49.95

G

horizons

Design-a-64 Contest Winners

Rhett Anderson

In November, I invited readers to redesign their 64s and send in pictures of the results. I'd like to thank all those who participated. I enjoyed each entry.

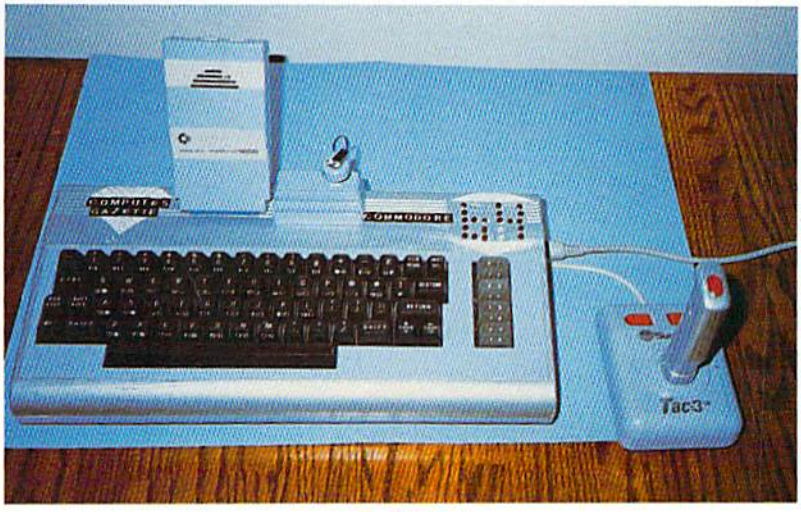
Below are the winning entries. As promised, each winner gets to choose any three titles from the *Gazette* disk library. Below each photo, you'll find some revealing words from the artists.

The Commodore 64-AS
Dennis Joslin

To make the 64-AS (Awesome System or Advanced System), I first took apart the disk drive. Then I took all the circuitry and the keyboard out of the computer. I lengthened the wires on the power LED so that it would reach to the front of the box. As you can see, I have a detached keyboard on my system. The last step was to make orange lightning bolts.

The Commando 64
Michael Rogalski

My entry is actually a reworked VIC-20. The artwork took all of two minutes to do, since I had about five cans of spray paint in my paint cabinet. The photos were taken at the Mojave Airport, where Dick Rutan launched and landed the Voyager *aircraft. If I win, I'd like the* Gazette 5-Year Index *disk,* GEOS *disk, and* Best Games *disk.*



The 64 c.c.
Aaron Woolf

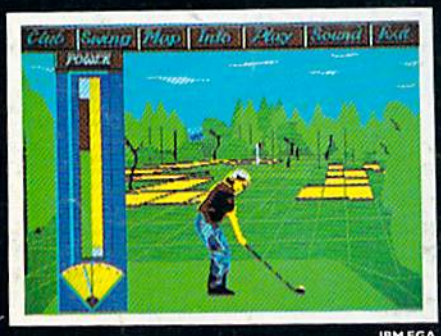
When I made my 64 c.c. (completely custom), I used LEDs to make the 64 at the top where the power indicator used to be. Around the keyboard section, I painted it light blue. Outside of the blue section, I painted it with aluminum paint to give it that metallic look. I also painted a Commodore 1670 modem, a Suncom Tac-3 joystick, and a Suncom disk notcher.

G

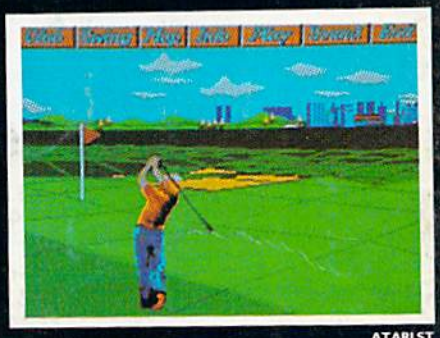
Greg Norman's Shark Attack!

THE ULTIMATE GOLF SIMULATOR

AMIGA



IBM EGA



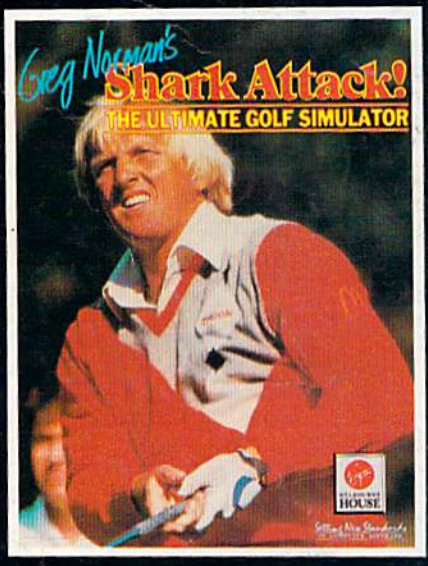
ATARI ST

It's professional golf at its best with the game's most aggressive and successful player, Greg Norman . . . a state-of-the-art golf simulation with more realistic three-dimensional graphics than you've ever seen before!

Rich in detail, Shark Attack is packed with features not included in lesser games, including:

- Pre-game Practice, Matchplay, Greensomes, Strokeplay, and Texas Scramble, all handicapped according to adjustable attributes, with single and team play options (up to four players).
- A professional caddy who can recommend the club to use for each shot.
- On-screen ability to design your own swing, for a game which is more dependent on skill than luck.
- Greg Norman's swing digitized for your instruction in the best golfing form.
- Ability to open and close the club face and adjust the loft, totally on-screen, for greater control.
- A 3-D perspective, which can be rotated through 360 degrees from any point. You can really walk each hole, and study the lie of each shot just like you would on a real golf course (one of the features that make this a simulation, not just a game).
- Changing wind and weather conditions, to add to the challenge.

Greg Norman's Shark Attack: the first true golf simulation, produced under the guidance of the Great White Shark himself! As on the pro circuit, total concentration, strategy and control are all required to come in under par!



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